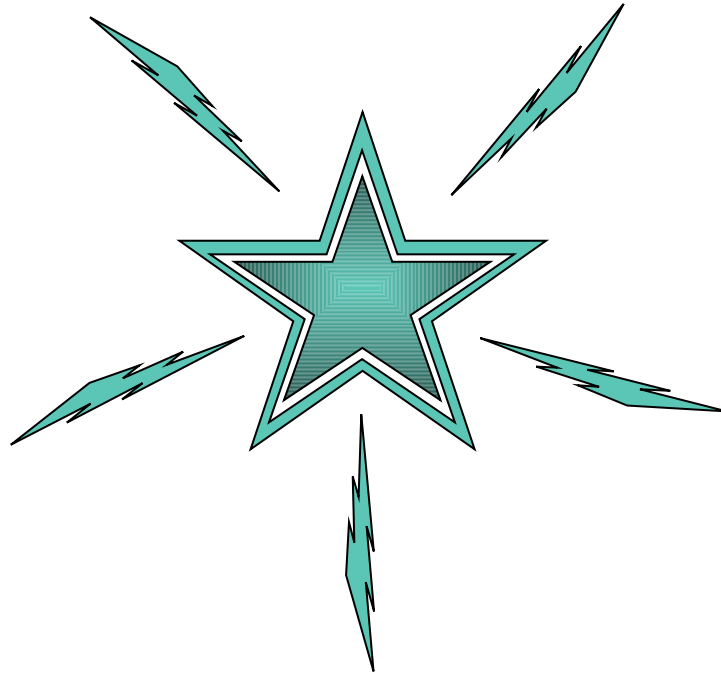


The logo for HydroLynx features the word "HydroLynx" in a stylized, black, serif font. The letters "H", "L", and "X" are in a bold, uppercase font, while "ydro" and "yn" are in a lowercase, cursive script. A black outline of a water droplet is positioned to the left of the "H". The entire text and droplet are enclosed within a thin, black, horizontal oval border.

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**NovaStar 5**

**Part I**

**User Manual**

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A102721-1

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# 1 Program Description

NovaStar 5 is a data collection and management software system designed to receive real-time hydro-meteorological data from ALERT radio transmissions and to solicit data from two-way radio systems and other external sources. Transmission of data may be initiated by the remote station, either on a set schedule or when a defined event occurs; for example at each tip of a rain gage. NovaStar 5 can also poll an external source for data on a configured schedule, like a remote station equipped with a model 50386 data collection unit or the USGS National Water Information Server (NWIS) Web. NovaStar 5 can ingest USGS stream gage data and process data formats including text files in the Standard Hydrologic Exchange Format (SHEF files), commercial satellite, and GOES satellite data.

NovaStar 5 is designed to act as a client-server application. The NovaStar 5 central data server runs under a Linux operating system and receives data broadcast on specified radio frequencies through serial or USB ports on the dedicated server computer. A web browser allows clients to log-on to the server from any computer with internet capabilities. Clients include one or more system administrators and any number of users. Users are not given access to the s that would allow them to alter the data structures defined by the administrator.

To make data useful for analysis and decision-making, the software administrator configures NovaStar 5 to perform error checking on the incoming data, and to convert sensor output into appropriate engineering units that are correctly associated with their geographic location and the time of the measurement. The system administrator can also configure NovaStar 5 to provide automatic warning to any number of users via screen alarms, audible alarms, emails, pager alarms, and phone/voice auto-dialed alarms if specific conditions are met. All users including the administrator are able to respond to alarms, customize map displays, view, analyze and plot data and generate data reports.

NovaStar 5 stores data in an ODBC compliant Postgresql database that can be accessed for analysis and display of time series point data by the administrator and users, either with NovaStar 5's internal mapping and reporting tools, or with compatible applications supporting SQL queries, like ArcGIS, Microsoft Excel, Microsoft Access, etc. The database is editable and includes post-event and historical data processing functions including statistical and time interval data analyses, time-based rating tables, and daily and monthly rainfall and streamflow reporting. Rainfall, water level and streamflow data can be summarized on varying time steps (daily, monthly, yearly).

## 1.1 What is new in NovaStar 5 for NovaStar 4X Users?

NovaStar 5 is a completely new application rather than an upgraded or a revised NovaStar 4X. While previous NovaStar applications ran under the QNX operating system, NovaStar 5 was developed with a Linux operating system and uses an open, ODBC-compliant relational database called Postgresql. However, users familiar with NovaStar 4X will find many familiar features in NovaStar 5. Differences include:

- ☑ NovaStar 5 provides a program that is map-based and accessible from any computer with Internet access.
- ☑ Stations are located on the map using their geo-reference of latitude and longitude rather than a coordinate mapping reference.
- ☑ In NovaStar 4X, it was not necessary to define stations. Only device definitions were needed to store sensor data reports in the database. NovaStar 5 has a hierarchical structure of *stations*, *devices*, and *points*. A station has a physical location and reports

sensor readings in device reports. The device reports may contain data readings for one or more sensors. Each sensor reading is stored as a separate point in the database.

- ☑ In NovaStar 4X, raw data reports were stored in the database. Scaled data was computed when the database was queried by a report display program. NovaStar 5 computes and stores the scaled data so it can be pulled directly from the database.
- ☑ In NovaStar 4X, rating table computation of streamflow was done when the database was queried by a report display program. NovaStar 5 computes streamflow when a data report is filed and stores the streamflow data in a separate table so it can be pulled directly from the database.
- ☑ In NovaStar 4X, digital status readings were stored in one device report. The line number was used to pull the desired status bit from the device data value. NovaStar5 automatically extracts the digital status bit value and assigns the value to a point.
- ☑ In NovaStar 4X, ALERT wind run and direction readings were stored in one device report. When the database was queried by a report display program, wind run was separated from direction and wind speed computed. NovaStar 5 automatically extracts the wind run and direction, computes wind speed and stores wind speed and direction in separate points.
- ☑ In NovaStar 4X, real-time equations were executed when the database was queried by a report display program. A real-time equation computes a new data value from one or more device readings. For example, Dewpoint Temperature could be computed from Air Temperature and Relative Humidity. NovaStar 5 automatically computes the equation data when the device readings are received and stores the computed data report in a separate point in the database.
- ☑ Alarm Groups are built around points in NovaStar 5, not around devices as they were in 4X. (Groups were available in 4X, but they are mandatory in NovaStar 5). A group can contain one or more points. Setting up alarms for many points with similar alarm criteria are expedited by forming a group.
- ☑ For data validation procedures comparing the change in value between a new data report and previous data reports, NovaStar 5 compares calibrated data reports and the **Change** value should therefore also be entered using calibrated units. In NovaStar 4X, change values used raw value units.

## 1.2 How to Use this Manual

The manual is intended to assist first-time users, and especially new administrators, by describing in sequence the steps required to create a data visualization and management system that truly informs decision-making processes by providing accurate, meaningful and timely data for both emergency response and post-event analysis. Part I of this manual describes the database user s that allow any user to view, analyze and plot data using the **Tabular Data, Report Data, Plot Data and Map Data** commands. Part II describes the system configuration process for system administrators, but also includes information, particularly at the beginning of each section, that can be useful for users who are able to view (but not edit) the structures that have been created by the system administrator to organize and map data and configure alarms. Each chapter includes information relating the program to likely goals of its use and describes issues that impact the program's implementation for typical applications.

Each chapter also relates specifically to each of the available program "pages" that allow users to work with the program. Working through the manual sequentially is likely to be unnecessary for those users familiar with previous NovaStar base station applications, but questions about how to proceed with any page you find on your screen should be easy to find in the section of this manual named after the page in question.

## 2 Server Platform Requirements

NovaStar 5 is installed on a dedicated server computer running the Linux operating system. The recommended minimum requirements for hardware are provided.

### 2.1 Linux Operating System

The recommended operating system is Debian Linux *testing* release. The *testing* distribution contains packages that haven't been accepted into a stable release yet, but they are in the queue for that. The main advantage of using this distribution is that it has more recent versions of software.

### 2.2 Hardware Requirements

The server should be configured with the following:

- Intel Dual Core CPU
- 1 GB RAM storage
- Dual 160 GB SATA 7200 hard disk drives
- DVD-RW
- SVGA video card
- Minimum 17-inch high resolution monitor
- Intel Gigabit NIC
- Internal PCI hardware modem (USR 56k 5610B HW modem PCI)
- 1 serial port, 1 parallel port, multiple USB ports
- Keyboard and mouse

### 2.3 Local Backup of Data Management System

Backup of data and system configuration information is accomplished using the dual 160 GB SATA 7200 hard drives and RAID1 backup software.

### 2.4 Remote Access

Remote access to the server computer is provided through the internal modem and an analog phone line.

### 2.5 Installation

The NovaStar 5 application is available from the HydroLynx ftp site ([ftp.hyrdolynx.com](ftp://ftp.hyrdolynx.com)). The installation package can be downloaded with an authorized user name and password using either file transfer protocol (ftp) or secure shell file transfer protocol (ssh). Once access to the site is established, the following files are required in order to install the NovaStar 5 application:

- novastar5install.exe

The application can be installed by a user with sudo privileges using the command:

```
sudo ./novastar5install.exe
```

The computer must be rebooted after installation of the application is complete.

Software updates are also available from the same web site. The installation of software updates will not erase an existing database; however, it is good practice to backup any existing databases before installing an update. A backup of the database can be made using the NovaStar 5 database backup program:

```
nsdbbackup "filename.backup"
```

After installation, NovaStar 5 can be accessed either at the server or by any computer with Internet access.

## 2.6 System Configuration

To complete installation of the NovaStar 5 system, a few system configuration items should be addressed by either the local network administrator or the NovaStar 5 administrator. These system configuration items are addressed from within the NovaStar 5 application; using the **System** menu command on the *Administrator Home* page. The default administrator login is:

- User name: admin
- Password: admin

These **System** parameters provide options that are useful for local network management and allow administrators to set certain system defaults.

When you click on the **System** menu command on the *Administrator Home* page, the **Configuration List** page appears, and the **System** menu command expands to show all of the **System** subcommands, including **Configuration List**, **Data Type List**, **Nova Score List**, **Scheduler List**, **Serial Port List**, and **View Log File**. The **Configuration List** and the **Serial Port List** should be addressed as the final step required for completing installation. Use of the remaining **System** capabilities is described in Part II, Section 8.

### 2.6.1 Configuration List

To reach the **Configuration List** page, click on the **System** menu command on the *Administrator Home* page. The **Configuration List** page (Figure 1) allows you to set certain default preferences for the NovaStar 5 system and provides options that are useful for local network management, particularly when there is a problem or the hard drive requires maintenance.

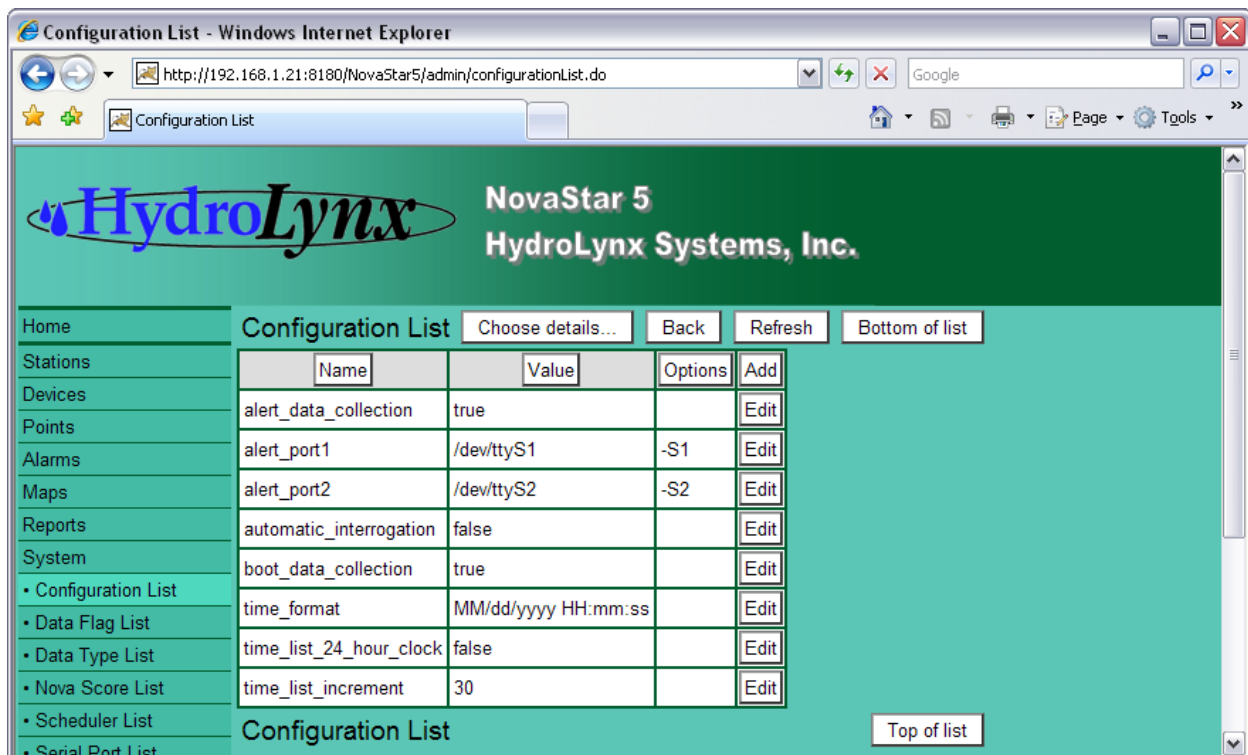


Figure 1. Configuration List

Clicking on any of the column heading buttons will reorder the items in the **Configuration List**, numerically or alphabetically, by that detail. You can further customize the appearance of the **Configuration List** page using the **Choose Details...** button to access the **Configuration List Details** page. Each **List** page in NovaStar 5 has an associated **List Details** page. The checkboxes on **List Details** pages control the information included and the default organization of the information on the associated **List** page. A full description of the features available on **List Details** pages is provided in Section 6.1.1 which describes the **Point List Details** page.

The items appearing in the **Configuration List** are described in Table 1.

Table 1. Configuration List parameters

Name	Value	Options
alert_data_collection	When true, ALERT data collection will begin automatically on system boot up or when the data collection is manually started. Data collection can be disabled by setting this parameter to “false” when suspension of data collection would be useful for hard disk maintenance or system diagnosis.	
alert_port#	Specifies the serial port to which the ALERT decoder is connected. Replace # with 1 for the first decoder, 2 for the second, and so on. ALERT data is read by the system from that serial port. Names are assigned by the Linux system as part of system installation but will be formatted like the default: /dev/ttyα#, where α is a letter and # is 0,1,2,or 3.	-S # sets the port line number. The line number is written in the alert data collection log file to indicate which line a data report was received on. -B baudrate sets the port baud rate. This overrides the baud rate set in the Serial Port List (see Section 8.6)
automatic_interrogation	When true, remote station polling will begin automatically on system boot up or when the data collection is manually started. Automatic remote station polling can be disabled by setting this parameter to “false” when suspension of data collection would be useful for hard disk maintenance or system diagnosis. The parameter boot_data_collection must be true to start automatic remote station polling on booted	
boot_data_collection	When true, data collection will begin automatically on system boot up. Data collection can be disabled by setting this parameter to “false” when suspension of data collection would be useful for hard disk maintenance or system diagnosis. The automatic data collection starts the alert_data_collection and automatic_interrogation processes.	
time_format	Specifies the format for displaying time in NovaStar 5 reports. Years can use a two-digit or four-digit formant, and dates can be displayed with the month, day and year in the desired order. Times can be displayed using either a 24-hour clock or a 12-hour clock by setting the hour value using either capital H’s or lower case h’s, respectively. For example: MM/dd/yyyy HH:mm:ss	
time_list_24_hour_clock	Specifies the format for selecting time in the drop-down selection lists that are available in data reporting s throughout NovaStar 5. When true, the 24-hour clock is used.	
time_list_increment	Specifies the interval, in minutes, between choices of time increments in drop-down	

	selection lists that are available in data reporting s throughout NovaStar 5. For example, when the time_list_increment is set at 30, the time choices in data display lists will be limited to 30-minute intervals.	
--	--	--

## 2.6.2 Serial Port List

When you click on the **Serial Port List** command on the *Administrator Home* page, the **Serial Port List** page is displayed (Figure 2). Computer I/O ports used by NovaStar 5 must be named, typed and configured.

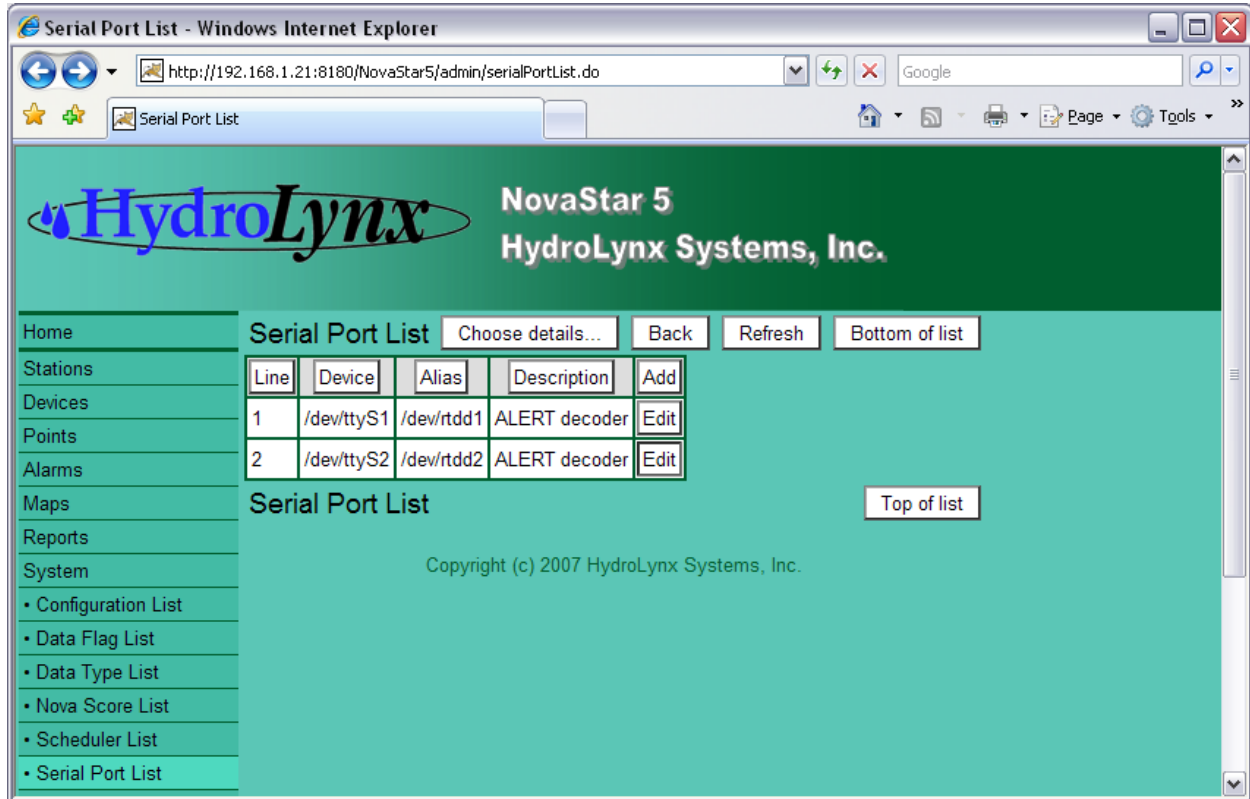


Figure 2. Serial Port List

I/O port configuration includes the baud rate, parity, flow control, modem initialization and other parameters. The **Serial Port List** shows all of the serial port connections that are configured for the system and can show the **Device**, **Alias**, **Description**, and **Line** associated with each serial port map. Clicking on any of the column heading buttons will reorder the serial port maps in the **Serial Port List**, numerically or alphabetically, by that detail. The **Choose details...** button allows you to specify what information is displayed by the **Serial Port List** page using the **Serial Port List Details** page. Each **List** page in NovaStar 5 has an associated **List Details** page. The checkboxes on **List Details** pages control the information included and the default organization of the information on the associated **List** page. A full description of the features available on **List Details** pages is provided in Part II, Section 2.1, which describes the **Station List Details** page.

Click on the **Edit** button on any row in the **Serial Port List** table to view or edit the information that has been entered about that serial port (or to delete a serial port map) using the **Serial Port Edit** page (Figure 3). To map a new serial port for the **Serial Port List** table, use the **Add** button at the upper right-hand corner of the **Serial Port List** table to access the **Serial Port Add** page. You can also create a new serial port map based on an existing template serial port map using the **Serial Port Copy** page, as follows. First, click the **Edit** button associated with the template serial port map to access its **Serial Port Edit** page. From there, the **Copy** button can be used to access

the **Serial Port Copy** page and create a new serial port map. The **Serial Port Add** page, the **Serial Port Copy** page and the **Serial Port Edit** pages all provide the same input fields.

Figure 3. Serial Port Edit

The serial port parameters that are edited or input using the **Serial Port Add**, **Serial Port Copy** or **Serial Port Edit** pages are grouped under **Identification**, **Connect parameters**, **Flow control**, and **Modem control** headings.

### Identification

The **Name** and **Alias** for each serial port must be unique identifiers specifying the serial port to be mapped. The **Name** is the Linux I/O port device name assigned by the Linux system as part of system installation and will have a default format of `/dev/ttyα#`, where  $\alpha$  is a letter and  $\#$  is 0,1,2,or 3. The **Alias** is an alternate name assigned to an I/O port. Alias names are used by NovaStar 5 to find specific I/O ports in the system, and can make it easier to maintain the system after hardware changes. If ever the I/O port must be moved, you do not have to change the program start argument; just assign the alias to the new I/O port. The **Description** can be used to enter descriptive information about serial port assignments. Use the **Line** drop-down list to select the line associated with the serial port.

## Connect parameters

The parameters for serial port configuration that are grouped under the **Connect parameters** heading are as follows:

- **Baud Rate** is used to enter the communication baud rate for the serial port: 300, 1200, 2400, 4800, 9600, 19200, 38400. **Parity** can be defined as None, Odd, Even, Mark or Space. Use parity None by default. **Data bits** for the communication are 5, 6, 7 or 8. Use 8 data bits by default. The communication **Stop bits** can be defined as either 1 or 2. Use 1 stop bit by default. **Allow Login** starts the tel-net login process when set to true. When **Echo** is set to true, typed characters are echoed back to the user in full duplex mode. Select false to operate in half duplex mode.
- The **Flow control** drop-down lists allow you to specify serial port flow control options. When **true** is selected for **Hardware** control, RTS/CTS flow control will be enabled. When **true** is selected for **Software** control, Ctrl-S/Ctrl-Q flow control will be enabled. Setting either **Hardware** or **Software** to **false** disables the associated flow control.
- **Modem control** parameters describe the way NovaStar 5 interacts with a modem, if required. When the Modem drop down list is set to false, NovaStar 5 starts dial-in modem answer/login service using the telephone modem command string entered as the Init String to initialize the modem for dial-in answer.

### 3 NovaStar 5 Basic Concepts

The operation of NovaStar 5 requires an understanding of some basic concepts and terminology which are introduced here and used throughout the document.

**Station:** In a standard ALERT network, each station is uniquely identified by its name, coordinate location (latitude/longitude), and station ID. Acceptable ALERT station ID numbers can range from 0 to 8191. NovaStar5 can accept station ID numbers from 0 to 99,999,999.

**Station Type:** Each station is equipped with a datalogger/data collection unit/transmitter installed at the station (HydroLynx 5096, Sutron 8210, Handar 555, or HydroLynx 50386). In NovaStar 5, station types describe attributes of this equipment.

**Device:** A station may have a number of different sensors installed, and in NovaStar 5 these data sources associated with a station are referred to as devices. Examples of installed sensors at a station include battery voltage, rain gage, and pressure transducer to monitor water level, wind speed/direction sensor, air temperature sensor, and relative humidity sensor. Device data may also be obtained from other external sources, for example when data is obtained via satellite or web. The data packets provided by most of these devices contain one measurement. Some exceptions are digital status (multiple digital inputs per data value transmission) and ALERT wind (wind run and wind direction are combined in one value transmission). When these compound device data reports are received, the data value is parsed to store individual sensor data values in the points assigned to the device. Most devices will have one point assigned.

**Device Type:** A device type characterizes the data values returned from a remote sensor. Devices producing data values of a similar nature are grouped into device types to facilitate configuration of the system, definition of alarm levels, and display of data. Device types specify the data unit associated with data from a device and can be used to configure data calibration and data checking for those device types for which device-level data calibration and checking is appropriate. The creation of device types is left to the administrator.

**Point:** A point represents a single measurement data stream in the database; either a data value received from a remote sensor or a computed or derived value. Points are assigned to devices and allow compound data packets to be parsed and stored separately in the database.

**Calibration:** A calibration is a collection of values that are used to convert raw device data into scaled point data in the desired engineering units before storing in the NovaStar 5 database.

**Alarm group:** Points producing data values that can be evaluated for alarm conditions using the same criteria are grouped into an alarm group. An alarm group lets you assign the same alarm threshold criteria and trigger values to multiple points. For example, an alarm group may be defined containing all batteries. The group is then assigned a low limit voltage alarm level, typically 11.0 volts. Incoming data for any battery in the group is checked against the alarm level defined for the group. The alarm group concept facilitates the configuration and display of alarm conditions for multiple sensors with similar alarm conditions.

**Time Series:** A time series is a temporally sequential grouping of data that are displayed on a consistent time step.

**Display Interval:** The display interval is used to create time series information from uneven-interval data for display purposes. ALERT data reports are received on uneven time intervals and are stored within the database as such. The display interval can range from 5 minutes to 1 year and sequentially increments from the starting time to the ending time set by the user. Without subsequent data analysis, the display interval can be used to create a time series display from uneven-interval data where the data point displayed at the interval boundary is the last one that occurred within the interval.

## 4 NovaStar 5 on the Web

NovaStar 5 provides for web-based access to the server using your preferred browser. Therefore, your toolbar layout may be different than what is shown in this manual. However, the NovaStar 5 application will function as documented. Browser capabilities that refresh the current page or move from the current page to a previous or subsequent page can be used as usual.

The NovaStar 5 home page URL is:

`http://myservername:8180/NovaStar5/index.do.`

The server domain name or IP address, *myservername*, must be provided by your local network administrator. Port number 8180 is the standard NovaStar 5 web page browser port. This may be changed by the NovaStar 5 system administrator.

Within NovaStar5, buttons are provided to allow you to conveniently move between pages.

- **Add** opens a page of blank or default fields to add a database record for the list type.
- **Apply** saves changes to the current page and then remains in that page for further input. Frequently using the **Apply** button allows a page to differentiate based on user inputs, allowing NovaStar 5 to adapt the input fields as required.
- **Back** returns you to the previous page without saving changes to the current page.
- **Bottom of page** jumps to the bottom of the current page. This is useful when you want to get to the bottom of a long list of information or to the bottom of a long edit page.
- **Cancel** ignores any changes to the current page and returns to the previous page.
- **Choose details...** opens **List Details** page where you can choose which fields are displayed, the sort order, and limits are applied to the list of data displayed.
- **Copy** opens a copy page from an edit page. The parameters on the previous edit page are copied to the new page. When you click **OK** or **Apply** on a copy page, a new record is added to the database.
- **Delete** removes the information displayed on an edit page from the database.
- **Detach** opens another copy of the current page in its own browser window. Your browser must allow pop-ups for this button to work.
- **Edit** opens an edit page for the database record selected from a list. The parameters shown in the page can be modified and saved to the database.
- **List** displays a list of database records for the type of information shown next to the button.
- **OK** saves any changes that have been made in the current page. If you are on an edit page, then you are returned to the previous page. If you are on a data request page then your data request is submitted and the data retrieved from the database is displayed.
- **Refresh** will reload the current page from the server. This is useful when you think the database has changed and you want to have the latest information displayed.
- **Reset** will update an edit page with the selection from a drop-down list.
- **Top of page** jumps to the bottom of the current page. This is useful to return to the top of the page when you have scrolled or jumped to the page bottom.
- **View** displays the view or edit page for the database record selected from a list. The parameters shown in the page can be modified by an *operator* or *administrator*.

## 5 The NovaStar 5 Home Page (User)

When you first access NovaStar 5, you will reach the NovaStar 5 default home screen (Figure 4). Without even logging in to the system you are able to view data in either tabular or graphical form and see recent data values displayed on the map or in formatted data reports, depending upon the system configuration that has been provided by the NovaStar 5 administrator.

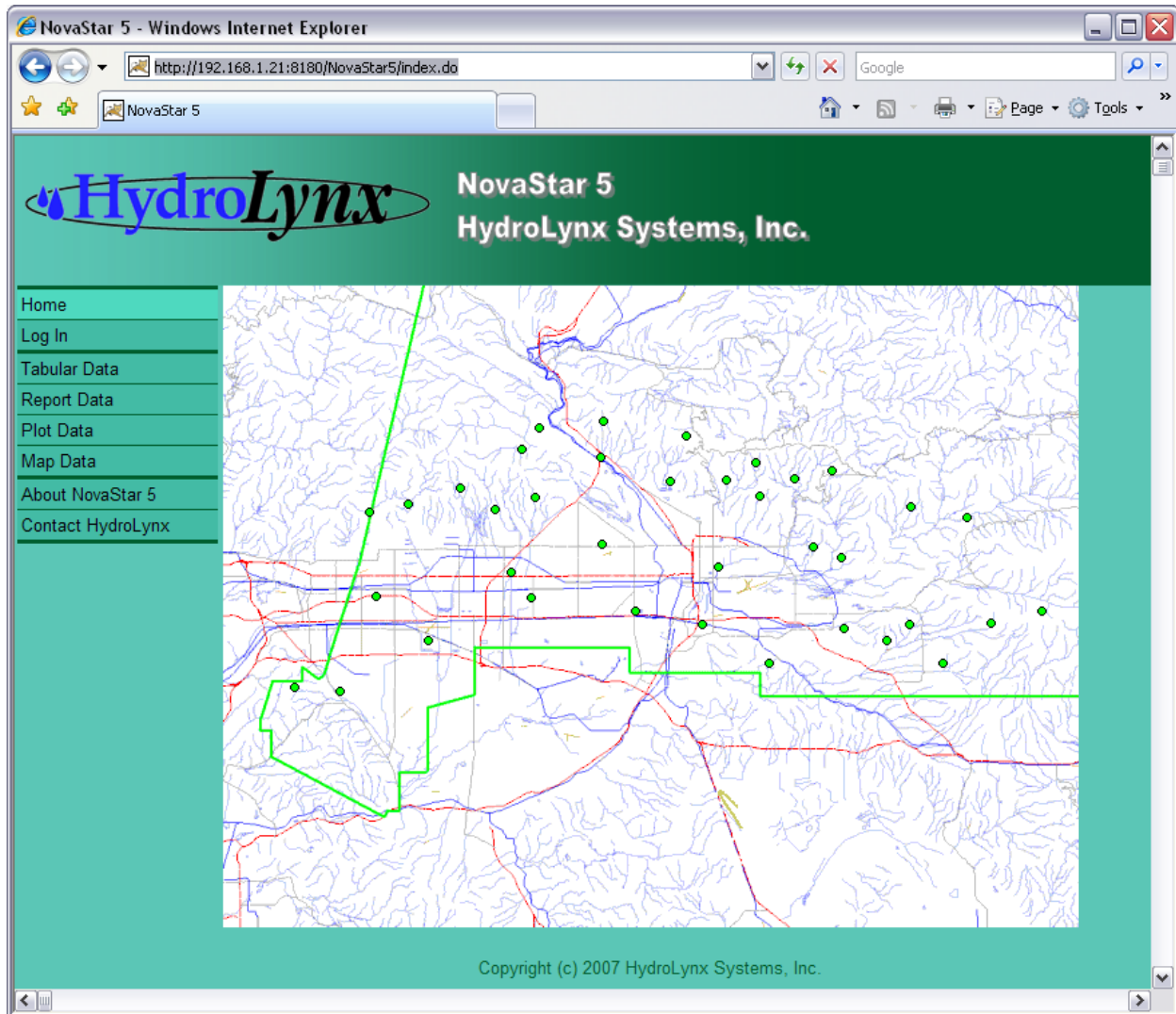


Figure 4. NovaStar 5 Web Home Page

The NovaStar 5 homepage can include a general map of the monitored area of interest, with each station identified by a green dot. Clicking on a dot allows access to a pop-up menu that displays information about the station, device, and point associated with the data point.

The command menu will include the **Home**, **Log In**, **Tabular Data**, **Report Data**, **Plot Data** and **Map Data** commands, as well as the **About NovaStar 5** and **Contact HydroLynx** commands. These commands are described in Part I of this manual for all users. Once you have logged in as a user, the *User Home Page* appears. The menu of commands at the upper left side of the screen expands upon login, allowing you to access system commands including **Stations**, **Devices**, **Points**, **Alarms**, **Maps**, **Reports** and **System**. These commands are described in Part II as they apply to administrators, who have full read/write access to the database configuration capabilities accessed by these commands. Users have read-only access to database configurations, with limited exceptions (especially with regard to active alarms), but users should refer to Part II of this manual as needed for information about these commands.

## 5.1 Log In

When you select the **Log In** command from the NovaStar 5 Home Page menu, the login dialogue box appears (Figure 5). The login window prompts you for your user name and password.



Figure 5. Log In

Users should enter the login name and password that has been given to you by the system administrator. The default login for an administrator is:

- User name: admin
- Password: admin

Click **OK** to login and your session will start. Click **Cancel** to return to the home page. The password is not echoed. Invalid passwords will result in an error message.

## 6 Tabular Data

A request to see data in tabular format can be made by any user. Selecting the **Tabular Data** command allows you to view the **Tabular Data Request** page (Figure 6).

Figure 6. Tabular Data Request

### 6.1 Tabular Data Request Page

The **Tabular Data Request** page is used to query the database for data and display it in a table. Click on the **OK** button to display the point data analysis specified in the input fields organized under the **Select Point**, **Select Display Time and Interval** and **Select Data Analysis** headings.

#### 6.1.1 Select Point

The drop-down list provided under the **Select Point** heading allows you to select the point data stream from which the desired data will be extracted. The **View** button accesses the **Point View** page, allowing you to view details about the point selected from the drop-down list. Descriptive information that appears in the drop-down list for the selected point can be modified using the **Choose details...** button to access the **Point List Details** page (Figure 7). The checkboxes on **List Details** pages throughout NovaStar 5 control the information that is included, and the default organization of the information, on the associated **List** page.

Use the checkboxes in the **Detail** column to select the detail columns that will appear in the drop-down **Select Point** list on the **Tabular Data Request** page. You can rearrange the order of those columns using the **Move Up** and **Move Down** buttons. You may sort the order of the

points displayed in the drop-down list by selecting one of the checkboxes in the **Order by** column. Sort is ascending unless the Reverse box is checked; then the sort is descending. Finally, using the drop-down lists that allow you to **Select the limits for the list display**, the points displayed in the drop-down list can include all stations or be limited to a specific station, include all devices or only points associated with specific device, include all device types or be limited to a specific device type, and include all alarm groups or only a specific alarm group. Once the desired details are “checked” and the limits for list display are set, the **OK** button enables the selected choices and returns you to the **Tabular Data Request** page. The **Select All** button will select all the details. The **Reset** button will return the “checked” details to their original default state. The **Cancel** button will implement no changes and return you to the **Tabular Data Request** page.

Point List Details

Select the details to display in the list

Detail	Order by	Reverse
<input checked="" type="checkbox"/> Point ID	<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/> Name	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Table row number	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Tagname	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Line	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Device type	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Station numeric ID	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Station name	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Station type name	<input type="checkbox"/>	<input type="checkbox"/>

Select the limits for the list display

Station: All Stations

Device: All Devices

Device type: All Device Types

Alarm Group: All Alarm Groups

Move Up  
Move Down  
Select All  
Reset  
OK Cancel

Figure 7. Point List Details

### 6.1.2 Select Display Time and Interval

The input boxes provided under the **Select Display Time and Interval** heading allow you to specify that period of time for which data will be viewed and to display data in a time-series format if desired. Select the **Starting Time** and **Ending Time** for data display by month, day, year and hour. The **Reset Time** button will reset the **Starting Time** to the beginning of the day for the **Ending Time**. A drop-down list to the right of the Ending Time lets you select a *Historic*

or the *Current* time. When *Current* is selected, the **Ending Time** is reset to the current time when tabular data is displayed. When *Historic* is selected, the **Ending Time** is fixed.

The **Display Interval** selected from the drop-down list specifies a consistent time-step for data display if desired. ALERT data reports are received on uneven time intervals and are stored within the database as such. To display the uneven-interval, event-based reports typical of ALERT systems, select **Show Data Reports**. To display data in a time series format rather than as uneven-interval data, select the desired time-step interval. The display interval can range from 5 minutes to 1 year and sequentially increments from the **Starting Time** to the **Ending Time**. Data is displayed only at the display interval boundary. If a display interval you desire is not in the drop-down list, select *Show Interval Fields* at the bottom of the drop list. You can then enter the display interval using the edit fields shown on the page. Click the **Show Interval List** button to redisplay the drop-down list of intervals.

If **Show Data Reports** is not selected, further statistical processing of the data is provided through the options available under the **Select Data Analysis** heading.

If you have selected *Current* time for the **Ending Time**, then you can enter a Refresh Interval to automatically update your data display on the selected interval. Select the refresh interval from the drop-down list or select *Show Interval Fields* at the bottom of the list to enter an interval not shown on the list. Click the **Show Interval List** button to redisplay the drop-down list of intervals. Select *None* to disable automatic updates on the data display page.

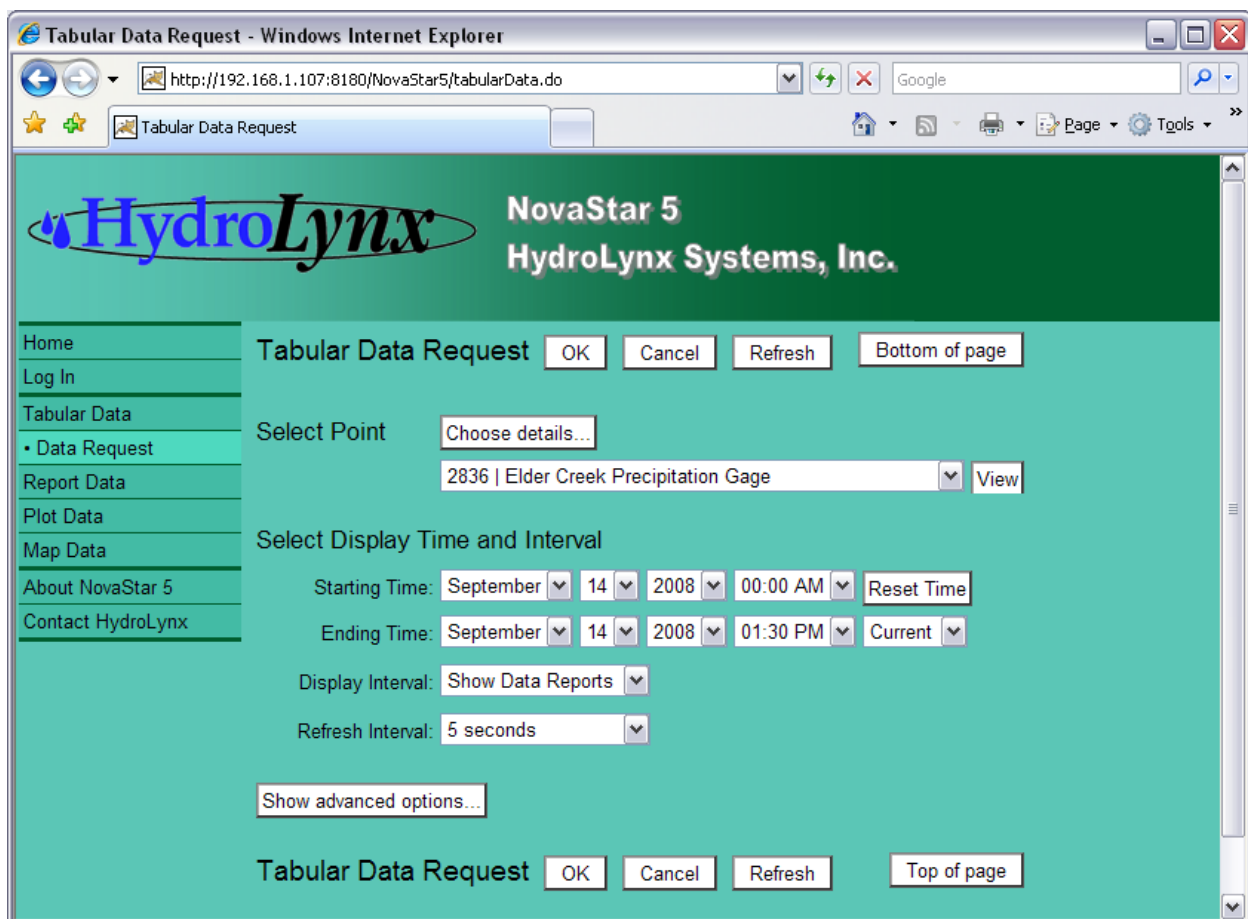


Figure 8. Tabular Data Request of Current time with 5 second refresh

### 6.1.3 Select Data Analysis

A number of statistical processing options available from the **Data Analysis** drop-down list create processed information at the user-defined interval boundaries defined by the **Display**

**Interval.** Some data analyses (Storm Rainfall and Rainfall Intensity) require an additional interval called the **Analysis Interval**. This interval field will be shown on the data request page when needed by the analysis selected. The statistical analyses options available in the **Data Analysis** drop-down list are described in Advanced analysis options are described in Table 3. . Advanced analysis options are described in Table 3.

Table 2. Data Analysis

Data Analysis	Description																								
Use Default Analysis	Use default data analysis assigned to point device type. Point device types other the Precipitation use Last Report in Interval analysis. Points with Precipitation device type use Period Rainfall analysis.																								
Data Report Closest to Interval	Finds the data report closest to the end of the Analysis Interval boundary. The report may occur before or after the interval boundary.																								
Last Report in Interval	Finds the last data report in the Analysis Interval boundary without going past the boundary.																								
Number of reports	Counts the total number of reports in the Analysis Interval.																								
Period Rainfall	Computes the total accumulation of rainfall during the Analysis Interval.																								
Storm Rainfall	<p>Computes the storm rainfall through multiple Analysis Intervals. The user must provide the “no rain” period length so that storm boundaries can be identify in the data. The “no rain” period length is defined by the Analysis Interval.</p> <p>This is where the Display Interval and Analysis Interval can be different. Storm rainfall accumulates rainfall over the Analysis Interval until a period of no rain is detected. The following example illustrates the difference between Period Rainfall and Storm Rainfall for a one hour display interval:</p> <table border="1"> <thead> <tr> <th>Hour</th> <th>Rain count</th> <th>Period Rainfall</th> <th>Storm Rainfall</th> </tr> </thead> <tbody> <tr> <td>00:00</td> <td>1.00</td> <td>0.00</td> <td>0.00</td> </tr> <tr> <td>01:00</td> <td>1.00</td> <td>0.00</td> <td>0.00</td> </tr> <tr> <td>02:00</td> <td>1.01</td> <td>0.01</td> <td>0.01</td> </tr> <tr> <td>03:00</td> <td>1.03</td> <td>0.02</td> <td>0.03</td> </tr> <tr> <td>04:00</td> <td>1.06</td> <td>0.03</td> <td>0.06</td> </tr> </tbody> </table>	Hour	Rain count	Period Rainfall	Storm Rainfall	00:00	1.00	0.00	0.00	01:00	1.00	0.00	0.00	02:00	1.01	0.01	0.01	03:00	1.03	0.02	0.03	04:00	1.06	0.03	0.06
Hour	Rain count	Period Rainfall	Storm Rainfall																						
00:00	1.00	0.00	0.00																						
01:00	1.00	0.00	0.00																						
02:00	1.01	0.01	0.01																						
03:00	1.03	0.02	0.03																						
04:00	1.06	0.03	0.06																						
Rainfall Intensity	Computes the maximum rainfall accumulation for a specified interval over a period of time. This is another situation where the Display Interval and the Analysis Interval can be different. The Analysis Interval defines the range of data that will be analyzed to determine the maximum rainfall accumulation occurring over the period of time specified by the Display Interval.																								
Difference in Report Values	Computes the difference between the last report in the Analysis Interval and the last report from the prior Analysis Interval.																								
Sum of Report Values	Computes the sum of report values within the Analysis Interval.																								
Mean	Computes the time-weighted average of the report values within the Analysis Interval.																								
Maximum	Reports the maximum value for the Analysis Interval.																								
Minimum	Reports the minimum value for the Analysis Interval.																								
Variance	Computes the variance of the time-weighted values within the Analysis Interval.																								
Standard Deviation	Computes the standard deviation of the time-weighted values within the Analysis Interval.																								
Skew	Computes the skew of the time-weighted values within the Analysis Interval.																								
Coefficient of Skew	Computes the coefficient of skew of the time-weighted values within the Analysis Interval.																								
Cooling Hours	Computes cooling hours from a base temperature that is defined as a constant under Advanced Options in the field called “Base value”.																								
Heating Hours	Computes heating hours from a base temperature that is defined as a constant under Advanced Options in the field called “Base value”.																								
Rate of Change in Units per Second, Minute, Hour, or Day	Computes the rate of change for the last report in the Analysis Interval relative to the prior report in the Analysis Interval. You can request rate of change units as per day even if the Analysis Interval is one hour. The analysis result displayed will be multiplied by 24 (e.g. a change of 1 unit per hour = 24 units per day). You may wish to do this because some SCADA applications expect data to be																								

	provided in gallons per day.
Runtime in Seconds, Minutes, Hours, Days	Runtime is the amount of time a digital status value is not zero. The concept can also be applied to any other data type. The runtime is computed to determine values that answer questions like "How long was the pump running on this day?" The time units (seconds, minutes, hours, days) define the output value. For example, 55 seconds, 35 minutes, 2.5 hours, or .5 days.
Volume in Units per Second, Minute, Hour, or Day	Integrates a volumetric flow rate over time to determine total volume. In NovaStar5, discharge is computed from stage using a rating table or equation. Discharge data are stored in a rated data table. An optional check box is available in the User Interface to display rated data. The volume computation units are the beginning data units integrated over time. So if the data is stored in cubic feet per second or the rating table output is cubic feet per second, then the volume units are cubic feet. To convert cubic feet to acre feet, a multiplier is used and is selected from a pick list in the advanced options to simplify the multiplier value entry.
Wind Speed	Computes the wind speed in units per hour from an incrementing anemometer wind sensor (a non-ALERT wind device type) for the last report in the Analysis Interval.
Vector Wind Speed	Returns the magnitude of the wind vector from an ALERT wind device type for the last report in the Analysis Interval.
Vector Wind Direction	Returns the direction of the wind vector in degrees from an ALERT wind device type for the last report in the Analysis Interval.

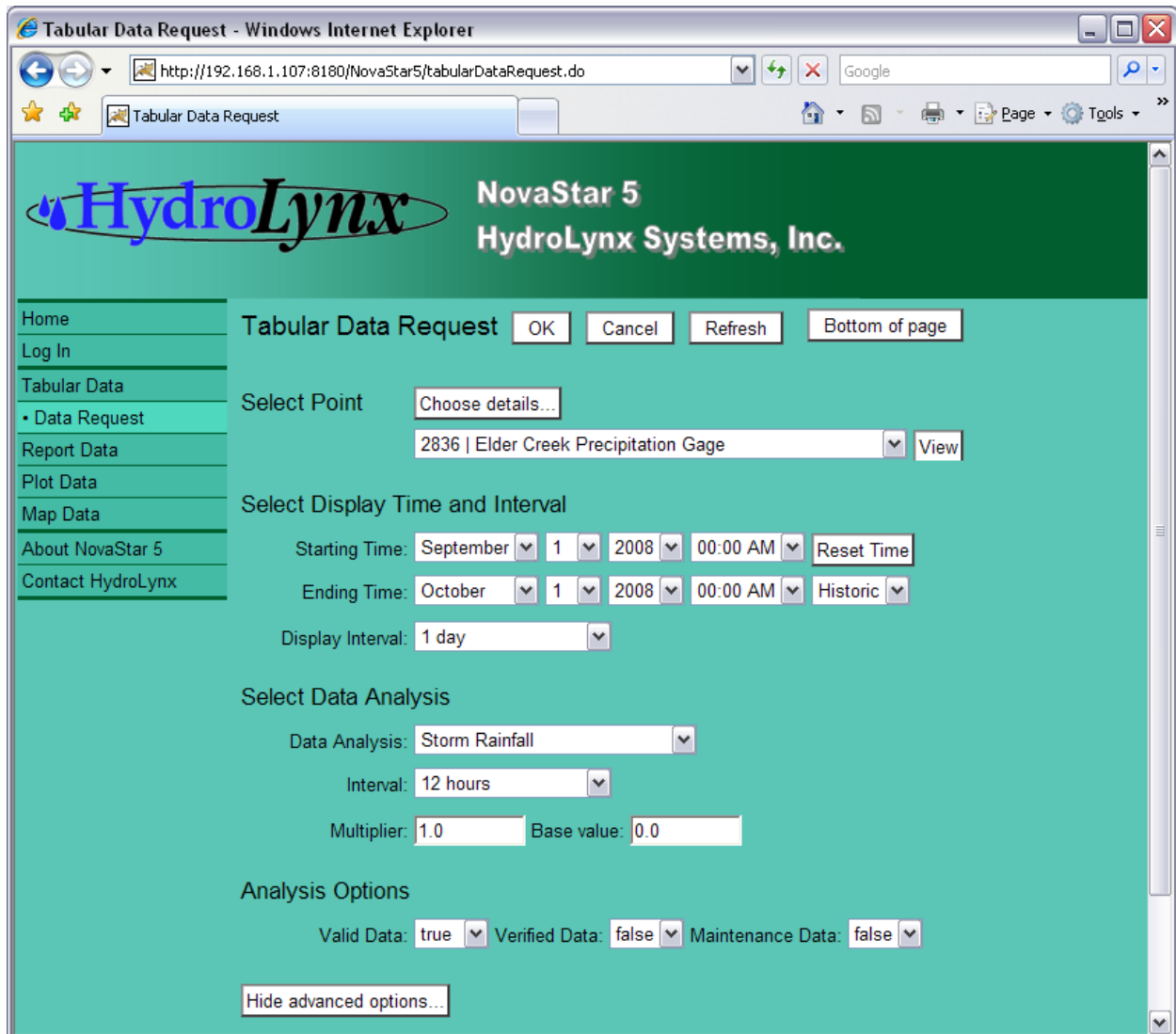


Figure 9. Tabular Data Request with Advanced Options

Table 3. Advanced Analysis Options

Advanced Analysis Option	Description
Multiplier	Multiply the computed value by a constant.
Base Value	Add a constant to the computed value.
Show Data	Selecting “true” for Show Data displays data reports from a plot or map in table below image. This option is not available for Tabular and Report data displays.
Valid Data	Selecting “true” for Valid Data will only process and display data reports that have passed the automated NovaStar 5 data quality checks.
Verified Data	Selecting “true” for Verified Data will only process and display data reports that have been manually verified by an operator. The verification flag must be set by a user logged in as an administrator.
Maintenance Data	Selecting “true” for Maintenance Data will only process and display data reports that have been manually marked as maintenance reports by an operator. These are reports that were transmitted from the site during calibration/maintenance tests. Normally these reports are not marked as valid.

## 6.2 Tabular Data Display

After the tabular data request parameters are entered, a request for tabular data can be executed by clicking **OK**. An example of the tabular display is shown (Figure 10).

The screenshot shows a web browser window titled "Tabular Data Display - Windows Internet Explorer". The address bar shows the URL: http://192.168.1.107:8180/NovaStar5/tabularData.do. The page header includes the HydroLynx logo and "NovaStar 5 HydroLynx Systems, Inc.". The main content area shows a "Data List" for point "2956 Larson Ranch Precipitation Gage". A table displays the following data:

Date and Time	Data Report	
01/01/2008 09:16:34	13.90	View
01/01/2008 21:16:34	13.90	View
01/02/2008 09:16:34	13.90	View
01/02/2008 21:16:35	13.90	View
01/03/2008 21:16:36	13.90	View
01/04/2008 09:16:36	13.90	View
01/04/2008 15:06:51	13.94	View
01/04/2008 16:47:14	13.98	View
01/04/2008 17:56:38	14.02	View
01/04/2008 18:19:01	14.06	View
01/04/2008 18:31:48	14.09	View
01/04/2008 18:53:14	14.13	View

Figure 10. Tabular Data Display

The **Data List** page displays the results of the query created by the selected options on the **Tabular Data Request**. When **Show Data Reports** was selected as the **Display Interval** on the **Tabular Data Request** page, the **Data List** page provides a **View** button to the right of each data report. Clicking this button will access the **Data View** page and show the entire data report

record. *Operators* and *Administrators* will have an **Edit** button instead of a **View** button to let them modify as well as view the database record (see Section 6.1.6).

Clicking on any of the column heading buttons in the **Data List** will reorder the data in the **Data List**, numerically or alphabetically, by that detail. You can customize the appearance of the **Data List** page using the **Choose details...** button to access the **Data List Details** page. Each **List** page in NovaStar 5 has an associated **List Details** page. The checkboxes on **List Details** pages control the information included and the default organization of the information on the associated **List** page

### 6.2.1 Data List Details

The **Data List Details** page (Figure 11) allows you to select the details displayed, sort the detail information, or limit the display of data marked by valid, verified and maintenance flags. The default details of the data list are shown in Table 4.

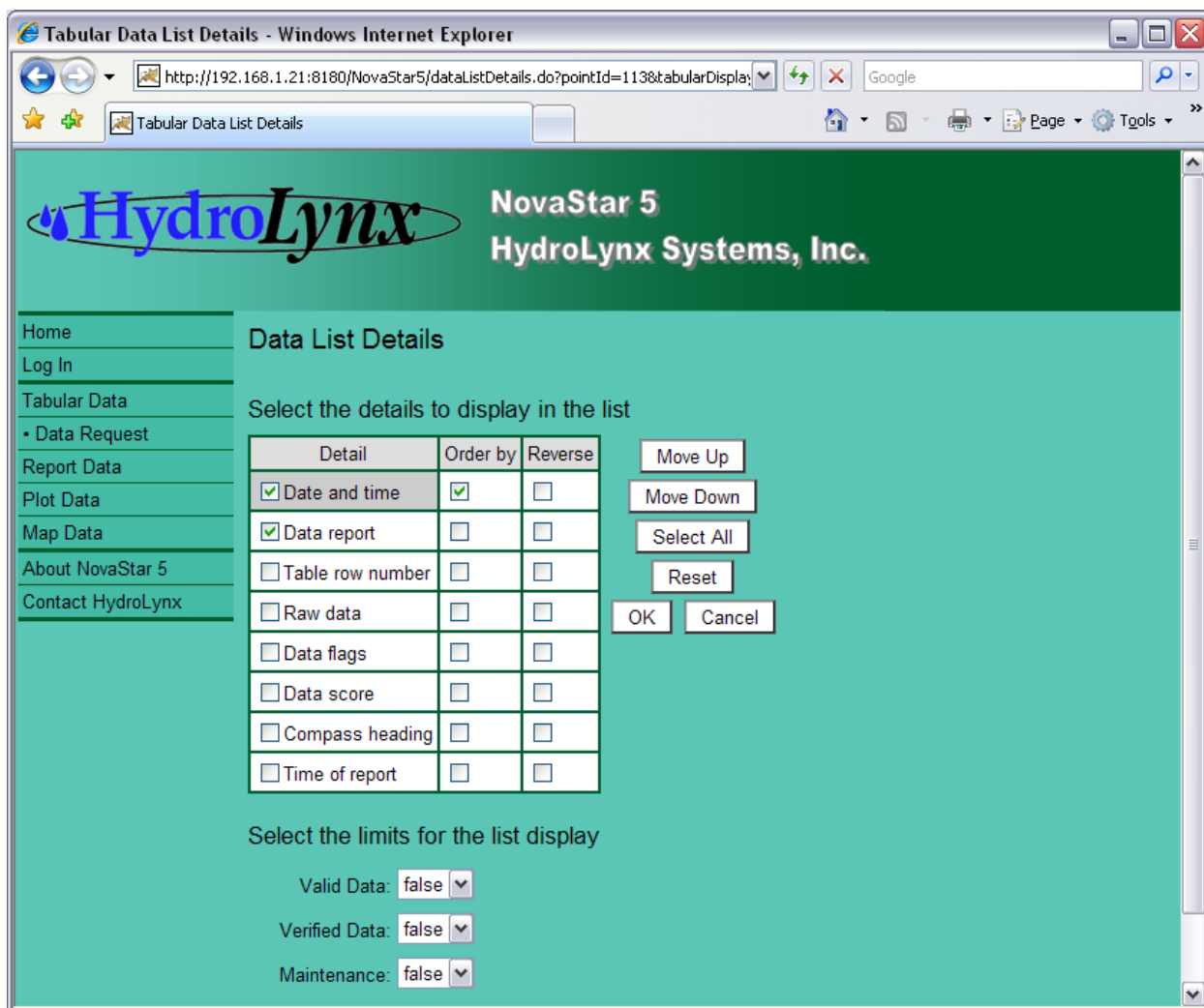


Figure 11. Data List Details

Table 4. Data List Details

Detail	Description
Date and time	Time of the data report when the display interval is <i>Show Data Reports</i> . Otherwise it is the time of the display time interval.
Data report	Scaled data value stored in the database when the display interval is <i>Show Data Reports</i> . Otherwise it is the value returned by the data analysis.
Table row number	Database data table row number.

Raw data	Raw data value received from the remote device.
Data flags	Flags set for data report, see Section 8.2 in Part II.
Data score	Nova score flag, see Section 8.4 in Part II.
Compass heading	Show data value as a compass heading (N, NNW, NW...) instead of degrees.
Time of report	Time of report found by analysis for display interval. For example, the time of a report returned by a maximum analysis request.

### 6.3 Data View/Edit Page

When the **View** or **Edit** button is clicked on a **Data List** page, the **Data View** or **Edit** page is displayed (Figure 12). The **View** page is shown for *guest* users, the **Edit** page for *Operators* and *Administrators*. The **View** page is read only.

Figure 12. Data Edit page

The **Table row** is the row number in the database data table. It is shown but cannot be changed. The **Point** assigned to the data report is shown in the drop-down list. Click the **View** button to display the Point parameters, click the **List** button to display a Point List. Click the **Apply** button to assign the point to the data report.

**Time** shows the time assigned to the data report. To add new reports to the database, click the **Copy** button and enter the new Time. The NovaStar 5 database does not allow two reports with the same point and time assignment. Click the **Apply** or **OK** button to save the copied report.

The **Scaled Value** is computed from the **Raw Value** when the report was stored in the database using the **Calibration** record shown at the bottom of the page. If you change the **Scaled Value** you can click the **Reset Raw** button to update the **Raw Value** using the calibration record. If you change the **Raw Value**, you can click the **Reset Scaled** button to update the **Scaled Value** using the calibration record.

Flag value shows the data report flag string. You can change the flag by checking or un-checking the flag check boxes. See section 8.3 in Part II for information on the data report flags. Click the **Apply** button to save the check box states; the flag string display will be updated.

The **Nova Score** drop-down list shows the score assigned to the data report. Click the **View** button to display the **Nova Score Edit** page for the selected score. Click the **List** button to display all scores in the system. See Section 8.4 in Part II for information on the nova scores.

The calibration record assigned to the data report is shown by default. Click the **Show More** button to see all calibrations assigned to the point and then select the record to assign to this data report. Click the **Show Less** button to reduce the number of calibration records shown. Click **View** to display the selected calibration record on the **Calibration Edit** page. Click the **List** button for a list of calibration records.

## 7 Report Data

A request to see data in a report format configured by the NovaStar 5 administrator can be made by any user. Selecting the **Report Data** command allows you to view the **Report Data Request** page (Figure13).

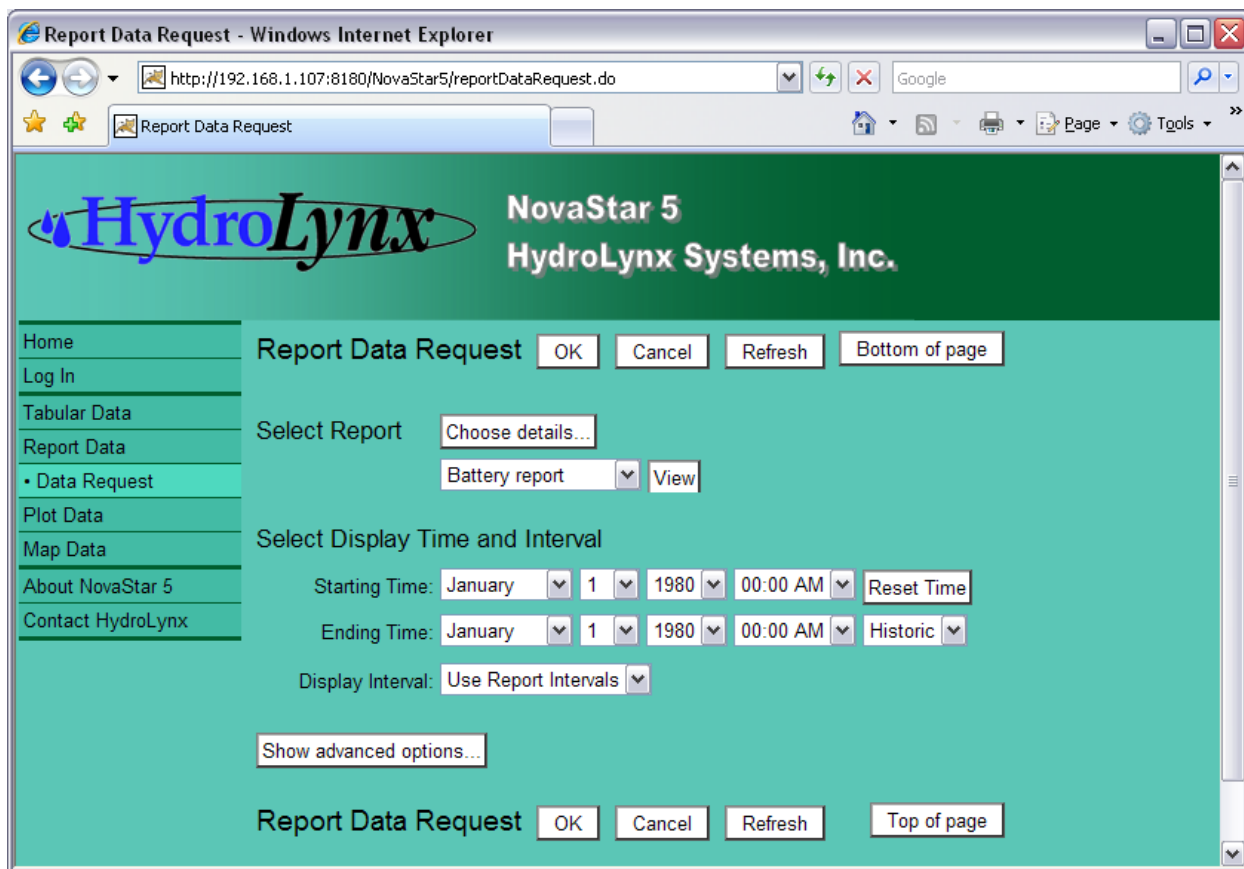


Figure13. Report Data Request

### 7.1 Report Data Request Page

The **Report Data Request** page is used to query the database for data that will be displayed in a report format predefined in the system. Click on the **OK** button to display the report's point data analysis specified in the input fields organized under the **Select Report**, **Select Display Time and Interval** and **Select Data Analysis** headings.

#### 7.1.1 Select Report

The drop-down list provided under the **Select Report** heading allows you to select the desired report from those that have been defined in the NovaStar 5 system. The **View** button accesses the **Report View** page, allowing you to view details about the report selected from the drop-down list, including the list of points that were selected for inclusion in that report.

Descriptive information that appears in the **Select Report** drop-down list for the selected report can be modified using the **Choose details...** button to access the **Report List Details** page. Each **List** page in NovaStar 5 has an associated **List Details** page. The checkboxes on **List Details** pages control the information included and the default organization of the information on the associated **List** page. A full description of the features available on **List Details** pages is provided in Section 6.1.1 which describes the **Point List Details** page.

### 7.1.2 Select Display Time and Interval

The input boxes provided under the **Select Display Time and Interval** heading allow you to specify that period of time for which report data will be viewed and to display data in a time-series format if desired. These inputs are used the same way as the Tabular Data Request. See Section 6.1.2 for details about these inputs.

The **Report Data Request** differs from the **Tabular Data Request** in the **Display Interval** input. The first entry in the drop-down list is *Use Report Intervals* instead of *Show Data Reports*. Select *Use Report Interval* for reports that have preprogrammed analysis intervals.

### 7.1.3 Select Data Analysis

Further statistical processing of the report data is provided through the options available under the **Select Data Analysis** heading. See Section 6.1.3 for details about these inputs.

## 7.2 Report Data Display

After the report data request parameters are entered, a request for report formatted data can be executed by clicking **OK**. An example of a report display is shown (Figure 13).

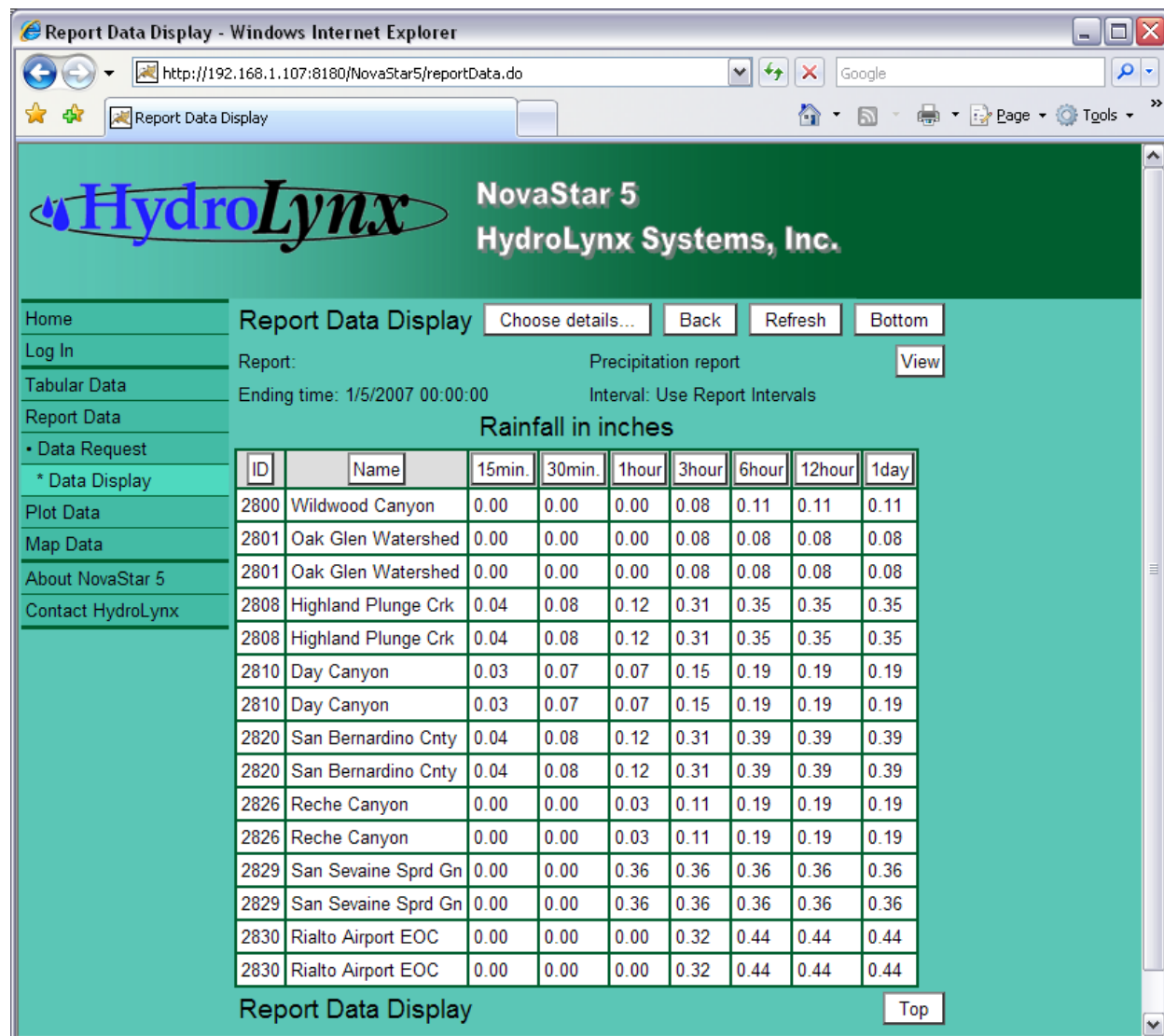


Figure 13. Report Data Display

The name of the report, the ending time, and interval are displayed above the report table. Clicking on any of the column heading buttons in the **Report Data Display** will reorder the data

in the **Data List**, numerically or alphabetically, by that detail. Descriptive information that appears in the **Report Data List** can be modified using the **Choose details...** button to access the **Report Data List Details** page. Each **List** page in NovaStar 5 has an associated **List Details** page. The checkboxes on **List Details** pages control the information included and the default organization of the information on the associated **List** page. A full description of the features available on **List Details** pages is provided in Section 6.1.1 which describes the **Point List Details** page.

### 7.2.1 Report Data List Details

The **Report Data List Details** page (Figure 14) allows you to sort the data columns, or limit the display of data marked by valid, verified and maintenance flags.

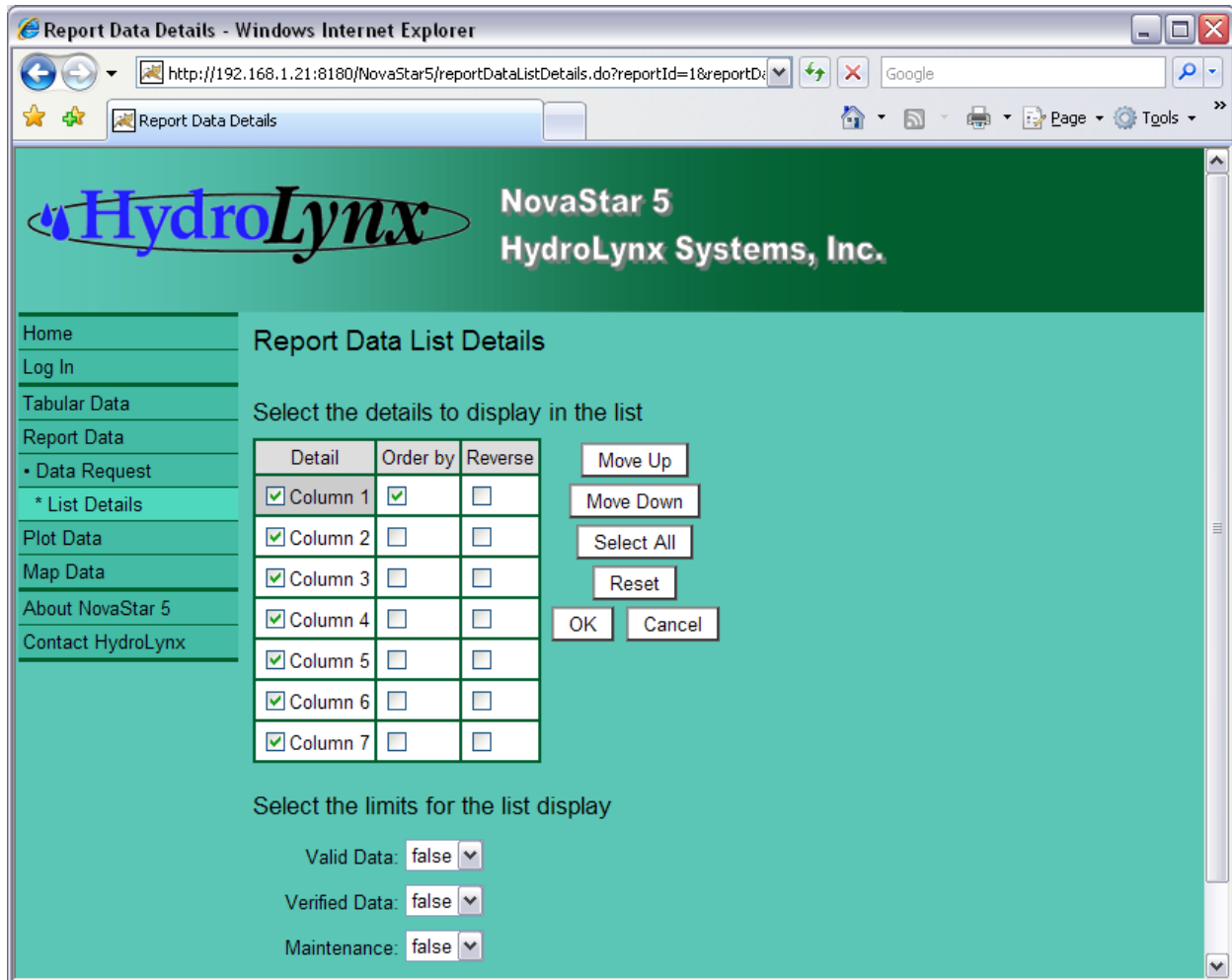


Figure 14. Report Data List Details

## 8 Plot Data

A request to plot data in graphical format can be made by any user. Selecting the **Plot Data** command allows you to view the **Plot Data Request** page (Figure 15).

Figure 15. Plot Data Request

### 8.1 Plot Data Request Page

The **Plot Data Request** page is used to query the database for data and plot it in a time series graph. Click on the **OK** button to plot the point data analysis specified in the input fields organized under the **Select Point**, **Select Display Time and Interval** and **Select Data Analysis** headings.

#### 8.1.1 Select Point

The drop-down list provided under the **Select Point** heading allows you to select the point data stream from which the desired data will be extracted. The **View** button accesses the **Point View** page, allowing you to view details about the point selected from the drop-down list. Descriptive information that appears in the drop-down list for the selected point can be modified using the **Choose details...** button to access the **Point List Details** page (Figure 7). The checkboxes on

**List Details** pages throughout NovaStar 5 control the information that is included, and the default organization of the information, on the associated **List** page.

### 8.1.2 Select Display Time and Interval

The input boxes provided under the **Select Display Time and Interval** heading allow you to specify that period of time for which plot data will be viewed. These inputs are used the same way as the **Tabular Data Request**. See Section 6.1.2 for details about these inputs.

### 8.1.3 Select Data Analysis

Further statistical processing of the plot data is provided through the options available under the **Select Data Analysis** heading. See Section 6.1.3 for details about these inputs.

### 8.1.4 Plot Range

The **Advanced Options** has an additional set of inputs under **Plot Range**. The **Plot Range** allows you to set the upper and lower plot scale limits. By default the limits are set to the point plot limits. The **Plot Data Request** page lets you override the defaults by entering the limit value. Click the **Reset** button to allow the plot program to automatically set the plot scale.

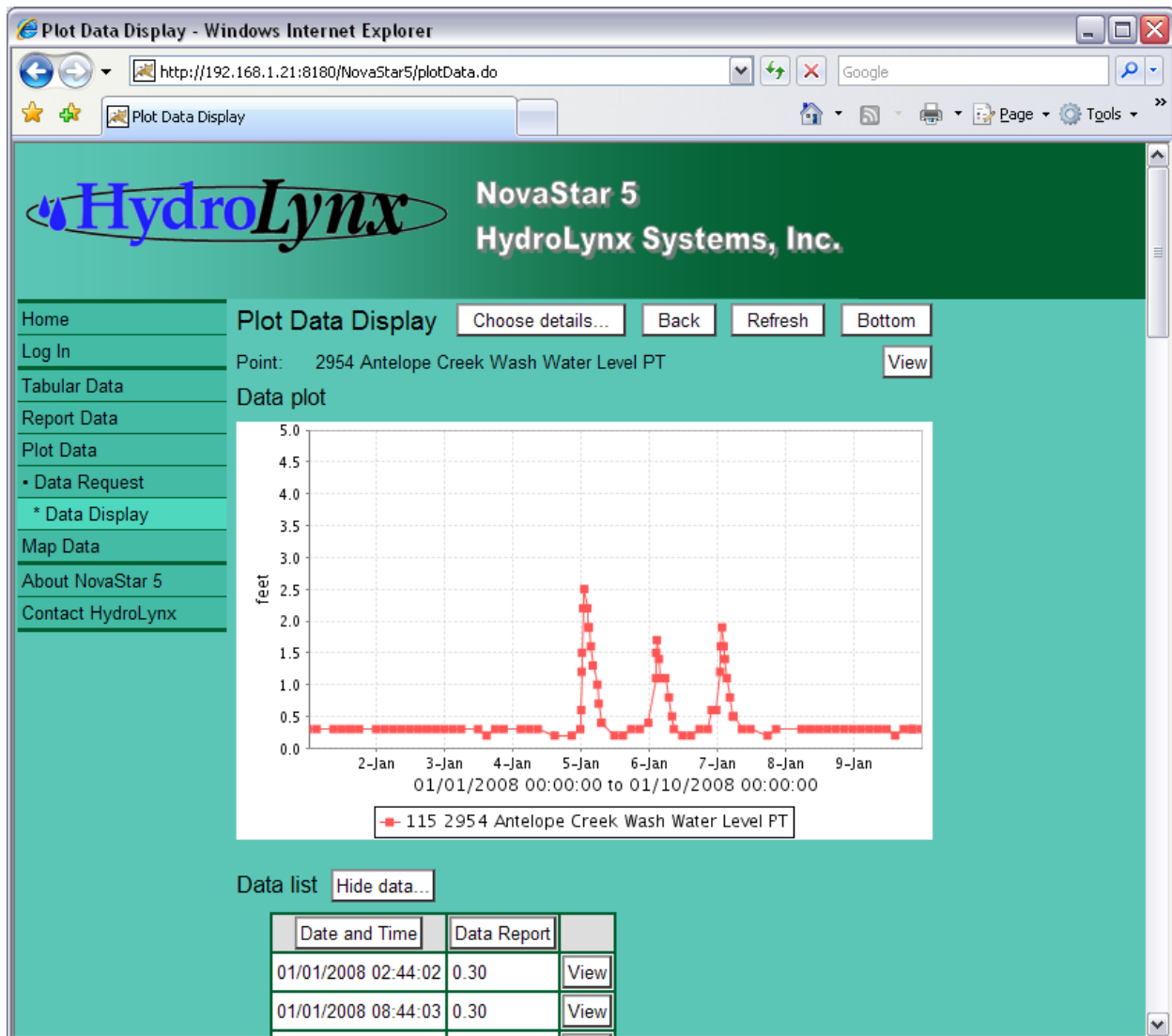


Figure 16. Plot Data Display

## 8.2 Plot Data Display

After the plot data request parameters are entered, a request for a plot data graph can be executed by clicking **OK**. An example of a report display is shown (Figure 16).

If **Show Data** was selected under the **Analysis Options** on the request page, a list of plotted data reports is shown below the plot. Click the **Hide data...** button to remove the data list. Click the **Show data...** button to re-display the data list. Clicking on any of the column heading buttons in the **Data List** will reorder the data in the list, numerically or alphabetically, by that detail.

### 8.2.1 Drill Down to Point Data

From the **Plot Data Display** a user can mouse over and click on a point on the plot to drill down to sensor data. Clicking on a point displayed on the **Plot Data Display** allows access to the **Data View** page (Figure 17).

*Guest* users are shown the **Data View** page for the data report. *Operators* and *Administrators* are shown the **Data Edit** page. The data report can be modified or deleted from the **Data Edit** page. Click **OK** to return to the **Data Plot Display**. See Section 6.3 for a description of these pages.

Plot Data Edit - Windows Internet Explorer

http://192.168.1.107:8180/NovaStar5/dataView.do?action=view&plotDisplay=115&

Plot Data Edit

**HydroLynx** NovaStar 5  
HydroLynx Systems, Inc.

Home  
Log In  
Tabular Data  
Report Data  
Plot Data  
• Data Request  
\* Data Edit  
Map Data  
About NovaStar 5  
Contact HydroLynx

**Data View** OK Back Bottom of page

\* Required field \*\* Must be unique

**Data Report**

Table row: 3094043

\*Point: Antelope Creek Wash Water Level PT View List

\*\*Time: 01/05/2008 01:09:06 MM/dd/yyyy HH:mm:ss

\*Scaled Value: 2.50

\*Raw Value: 25

Flag Value: V

Nova Score: 1 View List

Calibration: Choose details...

0.1 | 0.0 | 01/01/1980 00:00:00 View List

**Data View** OK Back Top of page

Figure 17. Plot Data Display Drill Down

### 8.2.2 Plot Data List Details

The **Plot Data List Details** page (Figure 18) allows you to limit the display of data marked by valid, verified and maintenance flags. It also allows you to show the data reports below the plot. Descriptive information that appears in the **Data List** can be modified using the **Choose details...** button to access the **Plot Data List Details** page. Each **List** page in NovaStar 5 has an

associated **List Details** page. The checkboxes on **List Details** pages control the information included and the default organization of the information on the associated **List** page. A full description of the features available on **List Details** pages is provided in Section 6.2.1 which describes the **Data List Details** page.

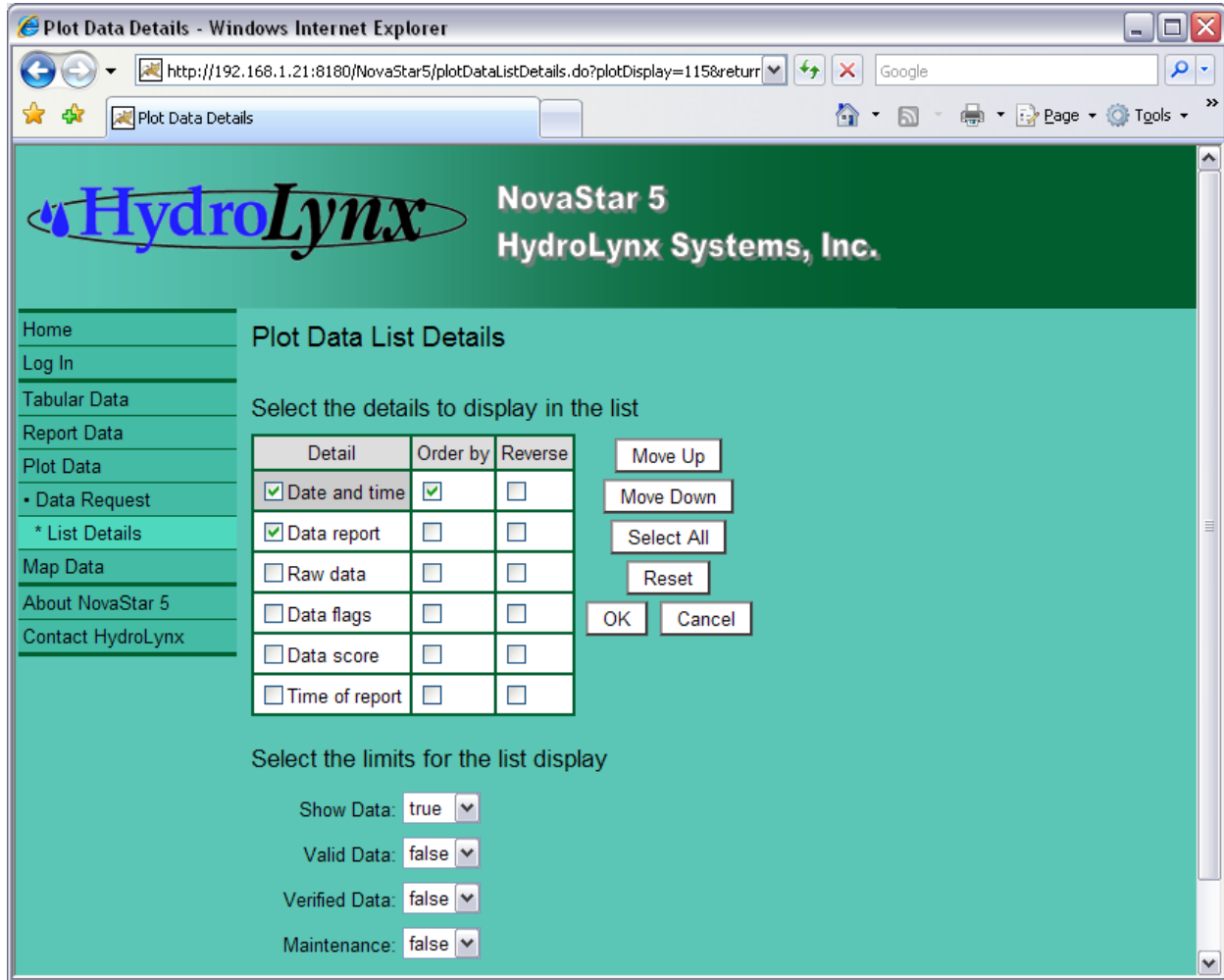


Figure 18. Plot Data List Details

## 9 Map Data

A request to plot data on a map background can be made by any user. Selecting the **Map Data** command allows you to view the **Map Data Request** page (Figure 19).

Figure 19. Map Data Request

### 9.1 Map Data Request Page

The **Map Data Request** page is used to query the database for data from a predefined set of map points. The data returned from the database query will be superimposed upon a background map image. Selecting **OK** will retrieve the data specified in the input fields organized under the **Select Map**, **Select Display Time and Interval**, **Select Data Analysis** and **Select Scroll Interval** headings. Selecting **Cancel** will return to the previous data request screen.

#### 9.1.1 Select Map

The drop-down list provided under the **Select Map** heading allows you to select the desired map from those that have been defined in the NovaStar 5 system. Descriptive information that appears in the drop-down list for the selected map can be modified using the **Choose details...** button to access the **Map List Details** page. Each **List** page in NovaStar 5 has an associated **List Details** page. The checkboxes on **List Details** pages control the information included and the default organization of the information on the associated **List** page. A full description of the features available on **List Details** pages is provided in Section 6.1.1 which describes the **Point List Details** page.

### 9.1.2 Select Display Time and Interval

The input boxes provided under the **Select Display Time and Interval** heading allow you to specify the ending time and time interval for the map data displayed. These inputs are used the same way as the **Tabular Data Request** (see Section 6.1.2) except that the **Map Data Request** page does not use a **Starting Time**. Instead, a **Scroll Interval** is used to allow paging through map data for a specified time interval. When a scroll interval is selected and the map is displayed, then **Back** and **Forward** button are displayed above the map. Click on the **Back** button to decrement or the **Forward** button to increment the **Ending Time** by the Scroll Interval; the map is re-displayed with the new ending time.

### 9.1.3 Select Data Analysis

Further statistical processing of the point data is provided through the options available under the **Select Data Analysis** heading. See Section 6.1.3 for details about these inputs.

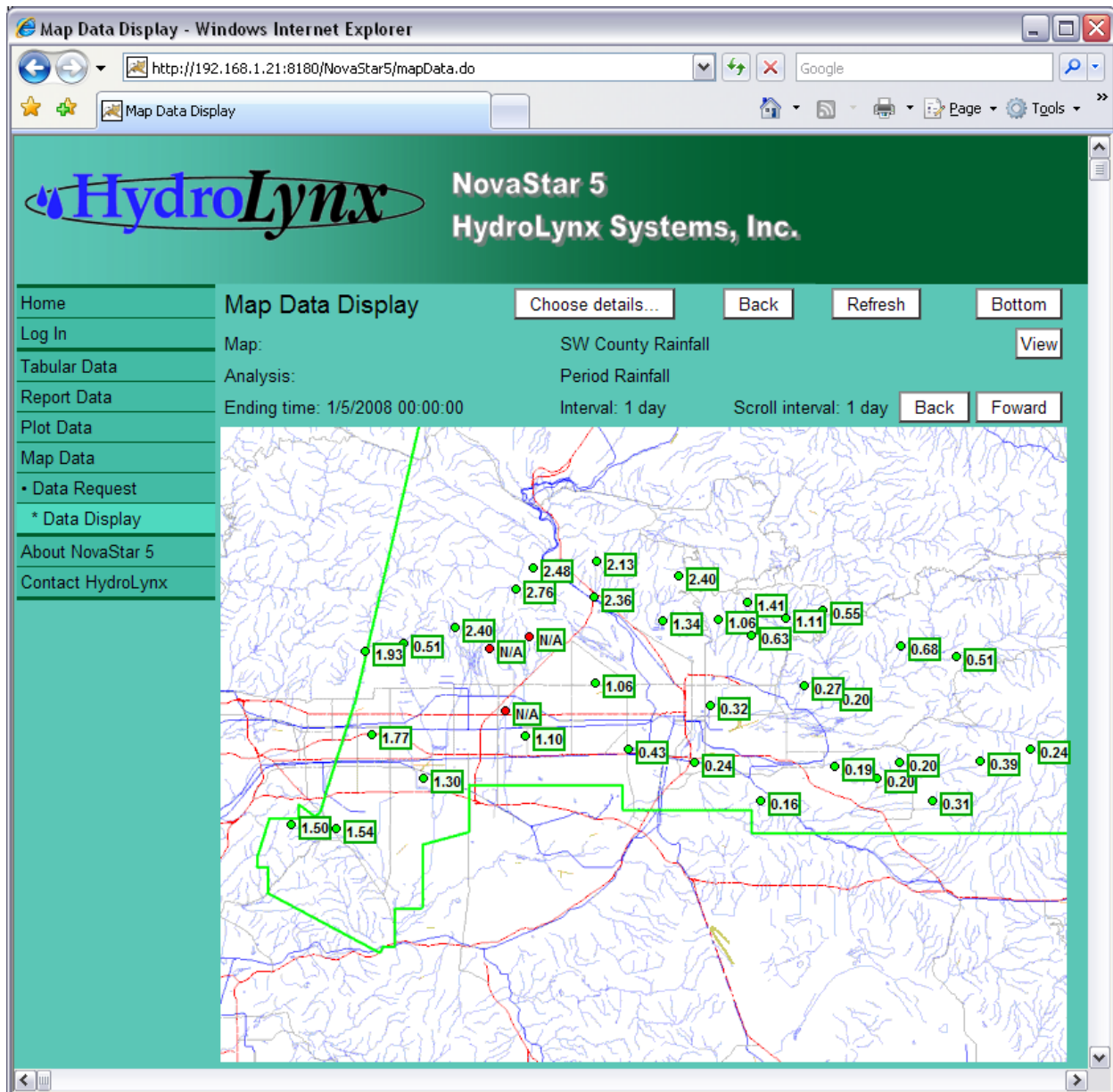


Figure 20. Map Data Display

## 9.2 Map Data Display

After the map data request parameters are entered, a request for mapped data can be executed by clicking **OK**. An example of the mapped display is shown (Figure 20).

The name of the map, the data analysis, ending time, and interval are displayed above the map. Point data readouts are displayed on the map to the right of the green site marker. If no data was available for the point, the string “N/A” is displayed and the site marker is red.

A pop-up tool-tip will appear when you mouse over a point readout or site marker.

### 9.2.1 Drill Down to Point Data

From the **Map Data Display** a user can mouse over and click on a point site marker or readout on the map to drill down to sensor data. Clicking on a point displayed on the **Map Data Display** allows access to the **Data View** page (Figure 21).

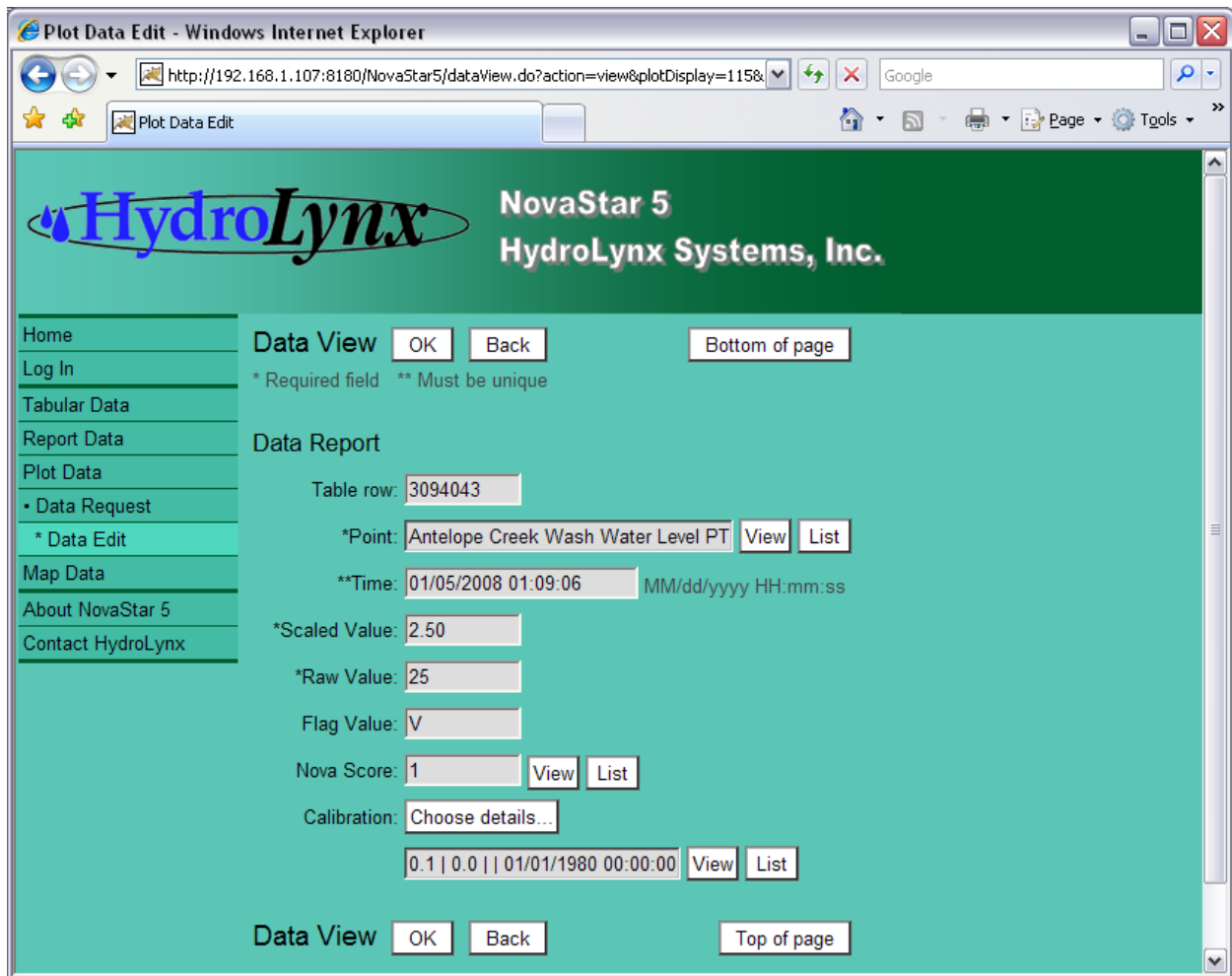


Figure 21. Map Data Display Drill Down

### 9.2.2 Map Data List Details

The **Map Data List Details** page (Figure 22) allows you to limit the display of data marked by valid, verified and maintenance flags. It also allows you to show the data reports below the map. Descriptive information that appears in the **Data List** can be modified using the **Choose details...** button to access the **Map Data List Details** page. Each **List** page in NovaStar 5 has an associated **List Details** page. The checkboxes on **List Details** pages control the information included and the default organization of the information on the associated **List** page. A full

description of the features available on **List Details** pages is provided in Section 6.2.1 which describes the **Data List Details** page.

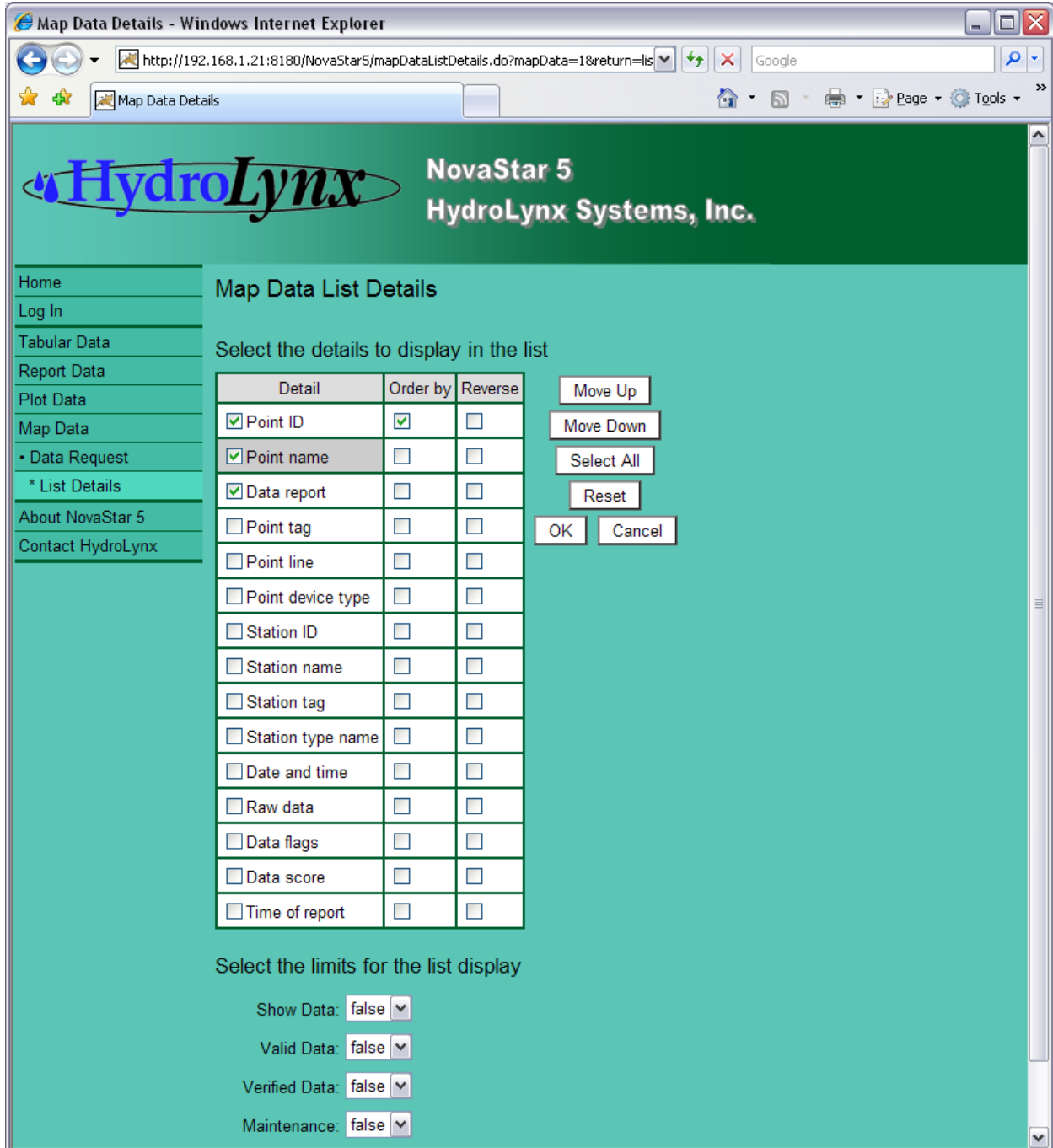


Figure 22. Map Data List Details

## 10 About NovaStar 5

Selecting the **About NovaStar 5** command allows you to view the **NovaStar 5 Version** page (Figure 23). This page displays the current software version and general contact information for HydroLynx Systems, Inc.

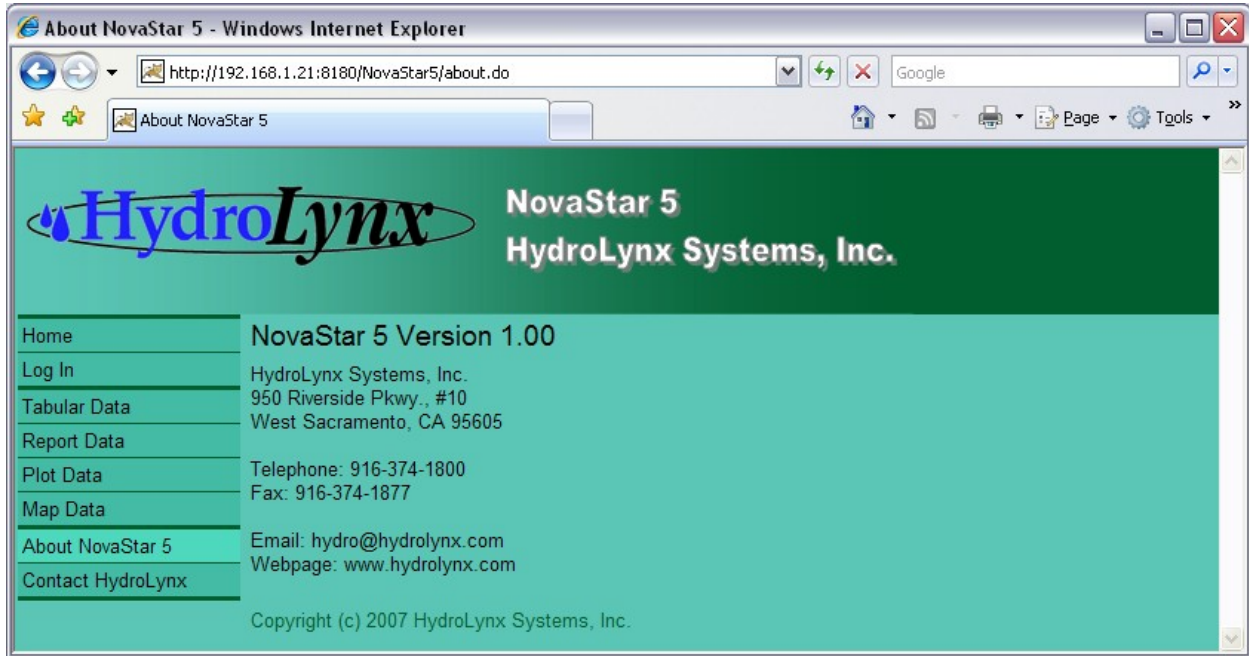


Figure 23. About NovaStar 5 Page

## 11 Contact HydroLynx

Selecting the **Contact HydroLynx** command allows you to view the **HydroLynx Contact Information** page (Figure 24). This page displays specific contact information for HydroLynx Systems, Inc. staff working in customer support, sales, and general information.



Figure 24. HydroLynx Contact Information