Vegetation Survey

To:	File	*cc:*	Brad Kubiak
From:	Abby Morton		Steve Mooney
Re:	Upper Harbor Brook PDI – Vegetation Survey		Robert Trent
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Date:	August 15, 2008		

This memorandum presents a summary of vegetation survey efforts conducted from July 15-17, 2008 by O'Brien & Gere in accordance with the *Wastebed B/Harbor Brook IRM – Revised Upper Harbor Brook PDI Work Plan* (Work Plan, O'Brien & Gere 2008). The vegetation survey for the Upper Harbor Brook area (Site) was conducted in association with sediment and soil sample collection described in the Work Plan. The objective of the vegetation survey was to identify and delineate the vegetative communities present in the Upper Harbor Brook ditch and wetland areas and to evaluate relative frequency, relative density, and relative basal area of species present. The resulting data may be used as a baseline to assist in restoration design and remedial action.

The fieldwork was performed in accordance with the methodologies presented in the "Vegetation Survey" section of the Work Plan. Vegetation survey locations were selected in wetland communities (see **Figure 1**) delineated for the *Harbor Brook Jurisdictional Wetland Delineation Report* (O'Brien & Gere 2003), as well as two stream bank locations (*i.e.*, Harbor Brook and Wastebed D/E drainage ditch). The following summarizes the vegetation survey activities.

A total of eleven vegetative plots locations were assessed for this vegetation survey (see **Figure 2**) for the Site. Seven vegetation plots were surveyed in the wetland communities (generally 1 plot per community) and two plots were surveyed on the banks of Harbor Brook and the Wastebed D/E drainage ditch (totaling four plots, 1 per bank).

Survey Methods

O'Brien & Gere biologists performed vegetative plot sampling to obtain quantitative data as described below. As described in the Work Plan, the methods from Elzinga (1998), ASTM (1997), and Roberts-Pichette and Gilllespie (1999) were utilized for the survey and data reduction.

As described above, eleven vegetative plot locations were surveyed for this event. Proposed wetland and stream survey areas were determined after reviewing aerial photographs and local mapping. For each survey area, vegetative covertypes were delineated using existing historical ecological reports and aerial photographs and refined through the detailed field survey performed for this effort. Each covertype designation was selected based on a comparison of observed characteristics with the ecological community descriptions presented in the New York Natural Heritage Program document Draft Ecological Communities of New York State (Edinger *et al.* 2002). The table below summarizes the location, vegetative covertype and dominant species observed in the survey plots.

Plot ID	Corresponding Wetland ID or Bank [1]	Vegetative Covertype [2]	Dominant Species
HB-VEG-**P1N**	WB D/E drainage ditch – north bank	Successional shrubland	field sowthistle, common buckthorn, tartarian honeysuckle
HB-VEG-**P1S**	WB D/E drainage ditch – south bank	Successional shrubland	Virginia creeper, Canada goldenrod, gray dogwood
HB-VEG-**P2**	WRR3	Reedgrass/Purple loosestrife marsh	common reed
HB-VEG-**P3**	WL6	Reedgrass/Purple loosestrife marsh	common reed

Plot ID	Corresponding Wetland ID or Bank [1]	Vegetative Covertype [2]	Dominant Species
HB-VEG-**P4**	WRR4	Reedgrass/Purple loosestrife marsh	common reed, Canada goldenrod, summer grape, purple loosestrife, staghorn sumac
HB-VEG-**P5**	WRR3	Successional northern hardwoods (w/ Floodplain forest species)	Canada goldenrod, ground ivy, summer grape, box elder
HB-VEG-**P6**	WRR2	Successional shrubland	willow species, clasping-leaved dogbane, common reed, purple loosestrife
HB-VEG-**P7**	WPC3	Reedgrass/Purple loosestrife marsh with Successional northern hardwoods (w/ Floodplain forest species)	common reed, common buckthorn, Eastern cottonwood
HB-VEG-**P8**	WPC1	Reedgrass/Purple loosestrife marsh (w/ stand of dogwood)	common reed, red-panicle dogwood
HB-VEG-**P9E**	Harbor Brook (OW#4) – east bank	Floodplain forest (w/ Successional northern hardwoods species)	Virginia creeper, common buckthorn, box elder
HB-VEG-**P9W**	Harbor Brook (OW#4) – west bank	Successional shrubland	ground ivy, swamp rose, box elder

1 = wetland ID numbers per the Delineations Report (O'Brien & Gere 2003)
2 = covertype designations adapted from Edinger *et al*. (2002)

The center of each vegetative plot was randomly selected by the toss of a tennis ball from the mapped location identified in the Work Plan. Stream/ditch locations were surveyed on each bank perpendicular to the center-line of the stream/ditch. Plot locations were recorded with a Trimble Global Positioning System (Trimble) and incorporated into site mapping (see **Figure 2**). For each survey location, a 3-meter (m) x 3m quadrat was set within a 10m x 10m quadrat using ropes and flagging and centered on the tennis ball or selected bank location. The total area of the sample plots was approximately 0.11 hectares (ha). Herbaceous and shrub/tree species under 3 feet (ft) tall (herbaceous layer) were identified in the 3m x 3m quadrat. Percent cover and frequency were collected for both species types. Shrub and tree species 3 to 19 feet tall (shrub layer) and trees and shrubs greater than or equal to (≥) 20 ft tall (tree layer) were identified in the 10m x 10m quadrat. Percent cover, frequency and density were collected for the shrub layer, while frequency, density and basal area were collected for the tree layer within the 10m x 10m quadrat. Data calculated from each plot included relative frequency, relative density, relative percent cover, and relative basal area. For plots performed along the banks of Harbor Brook and the ditches, the quadrat sizes were reduced to reflect field conditions encountered.

Importance values (IV) were also calculated for the herbaceous, shrub and tree layers. An IV is an index that profiles the structural role of a species in a vegetative community. It is useful for making comparisons among vegetative communities in reference to species composition (Roberts-Pichette and Gillespie 1999). Importance values are determined by averaging two or three of the relative metrics (*i.e*., the relative frequency, percent cover, density, or basal area) calculated for the vegetative layers. Importance values are derived to make it easier to compare communities that may differ in size or that were sampled at different intensities (Kuers 2005).

Results

O'Brien & Gere observed four types of vegetative covertypes during the survey process. Covertypes are listed in the above table and presented on **Figure 2**. In addition, O'Brien & Gere evaluated relative frequency, relative

density, and relative dominance of vegetation species present. Covertype observations and vegetative data analysis are presented below.

Covertype Analysis

Reedgrass/Purple Loosestrife Marsh (RG/PLS)
According to Edinger *et al*. (2002), RG/PLS is a community that has been disturbed by draining, filling, road salts, etc. in which common reed (*Phragmites australis*) and purple loosestrife (*Lythrum salicaria*) has become dominant. This community is commonly found along highways and railroads. Vegetation plots P2, P3 and P4 are representative of this covertype with few, if any, intermittent species such as Canada goldenrod (*Solidago canadensis*), summer grape (*Vitis aestivalis*), purple loosestrife (*Lythrum salicaria*), and staghorn sumac (*Rhus typhina*), box elder (*Acer negundo*) and tartarian honeysuckle (*Lonicera tatarica*). Vegetation plot P8 is predominately a RG/PLS community; however, the plot contained a significant stand of gray and red-panicle dogwood species (*Cornus foemina racemosa, C. racemosa*).

Reedgrass/Purple Loosestrife Marsh and Successional Northern Hardwoods (RG/PLS/NHW)
According to Edinger *et al*. (2002), a successional northern hardwood (NHW) community is a hardwood or mixed forest that occurs on sites that have been cleared or otherwise disturbed. Vegetation plot P5 is representative of NHW, as the area may have been previously cleared and/or disturbed. Vegetation plot P7 was classified as a mix of a RG/PLS and NHW covertypes was based on the observation of a dense RG/PLS with abundant tree cover of over approximately 85% of the plot area (*i.e.*, Eastern cottonwood (*Populus deltoides*) and common buckthorn (*Rhamnus cathartica*) and the presence of increased hydrophytic vegetative species (*i.e*., common reed).

Additionally, the floodplain forest community description (see below) in Edinger *et al*. (2002) is also reflective of plots P7 and P5 relative to species composition (*i.e*., Eastern cottonwood and box elder (*Acer negundo*)).

Floodplain Forest (FF)
According to Edinger, *et al.* (2002), a floodplain forest community is a broadly defined covertype consisting of hardwood forest that occurs on low terraces of river floodplains and river deltas. Some sites may be quite dry by late summer, while others may be flooded in late summer or early autumn.

Vegetation plot P9E (located on the eastern bank of Harbor Brook) was classified as a FF community based on the above description. Observed species at plot P9E included summer grape, Virginia creeper (*Parthenocissus quinquefolia*), common buckthorn, box elder, green ash (*Fraxius pennsylvanica),* and Eastern cottonwood. Additionally, the NHW community description in Edinger *et al*. (2002) is also reflective of plot P9E as the survey area may have been previously cleared or otherwise disturbed.

Successional Shrubland (SS)
According to Edinger *et al*. (2002), successional shrubland (SS) communities can typically be found on sites that have been cleared (for farming, logging, development, etc.) or otherwise disturbed. This community has at least 50% cover of shrubs. Vegetation plots PN1, P1S, P6 and P9W were considered representative of the SS covertype. Species observed at these plots included swamp rose (*Rosa palustris*), willow species (*Salix bebbiana, S. sericea*), gray, red-panicle and red-osier dogwood (*Cornus stolonifera*), European honeysuckle (*L. xylosteum*), and common buckthorn. Herbaceous species included common mugwort (*Artemisia vulgaris),* Canada goldenrod, false nettle (*Boehmeria cylindrica*), and field sowthistle (*Sonchus arvensis*).

Data Analysis
The vegetation survey identified and delineated the vegetative communities present at the Site. Frequency, density, basal area were metrics evaluated for species in each individual plot and are presented on the field data

forms (**Appendix A**) and on **Table 5a** for basal area calculations. Relative frequency, relative density, and relative basal area metrics were calculated for the overall survey area.

Relative Frequency
The sample plot data collection resulted in the identification of 34 vegetative species at the Site (**Table 1**). Species frequency and relative frequency are presented on **Tables 2a**, **2b**, **2c**. The observed species in the herbaceous layer, amongst the 11 sample plots, with the highest relative frequency include common reed (14.0%), Canada goldenrod (12.3%), summer grape (10.5%), and common buckthorn (7.0%). For the shrub layer, common buckthorn (20.7%) had the highest relative frequency, while box elder (41.7%) had the highest frequency for the tree layer.

Relative Percent Cover
Tables 3a and **3b** present individual species percent cover per plot and relative percent cover per survey area. The observed species with the highest relative percent cover in the herbaceous layer are common reed (55.3%), ground ivy (12.9%), and Canada goldenrod (11.1%). Red-panicle dogwood (32.9%), Virginia creeper (30.7%), and common buckthorn (9.2%) were the species with the highest relative percent cover in the shrub layer. Eastern cottonwood (48.3%) and box elder (33.1%) had the highest relative percent cover for the tree layer.

Relative Density
Species density and relative density are presented on **Tables 4a** and **4b**. For the shrub layer, red-panicle dogwood (40.1%), common buckthorn (14.0%), and silky willow (12.1%) had the highest relative densities. The highest relative densities for the tree layer were box elder (40.7%) and eastern cottonwood (29.6%). Relative percent cover, in the herbaceous layer, was used as its dominance measurement (not density); therefore, common reed, ground ivy, and Canada goldenrod demonstrated the highest relative percent coverage.

Relative Basal Area
Basal area is used to measure dominance for the tree layer. Based on data collected in the selected 10m x 10m sample quadrats, the dominant tree species at the Site expressed in relative basal area are common buckthorn (48.8%) and Eastern cottonwood (21.8%). Species basal areas and relative basal areas are presented in **Tables 5a** and **5b**.

Importance Values (IV)
As mentioned above, an IV is an index that profiles the structural role of a species in a vegetative community and is useful for making comparisons, if necessary, among vegetative communities. Importance values were calculated for the herbaceous, shrub, and tree layers in the selected sample quadrats and are presented on **Tables 6a**, **6b**, and **6c**. The herbaceous layer IVs were calculated using two parameters: relative frequency and relative percent cover. The shrub layer IVs were calculated using three parameters: relative frequency, relative density and relative percent cover, while the IVs for the tree layer were calculated using relative frequency, relative density, and relative basal area. The highest IVs for the herbaceous layer include common reed (34.7%), Canada goldenrod (11.7%), and ground ivy (8.2%). The highest IVs for the shrub layer include red-panicle dogwood (26.6%), common buckthorn (14.6%), and Virginia creeper (11.5%). The highest IVs for the tree layer include Eastern cottonwood (43.2%) and box elder (35.0%).

Field data forms completed during the survey are presented in **Appendix A**. Representative photographs of the vegetative communities and sample plots collected to photo-document existing conditions at the Site are presented in **Appendix B**.

Summary

Vegetative covertypes were identified for select wetlands and stream banks of the Upper Harbor Brook area. The primary covertypes identified at the Site include reedgrass/purple loosestrife marsh, successional shrubland, and successional northern hardwoods. Stands of common reed were prevalent over much of the Site. The identified covertypes are reflective of a relatively young community composition potentially due, in part, to recent anthropogenic disturbances; therefore, a mature vegetative community has yet to be established over most of the surveyed areas.

According to the *Heritage Program Element Ranks* (Appendix A of Edinger *et al.* 2002), successional shrubland global and state rankings are both G4 and S4, and successional northern hardwoods and reedgrass/purple loosestrife rankings are G5 and S5. Floodplain forest rankings are listed as G3-G4 S2-S3. The rankings G4 and S4 describe a community to be "apparently" secure globally and within NYS, while G5 and S5 ranked communities are described as "demonstrably" secure globally and within NYS. The rankings G3G4 and S2S3 are describe a community "apparently" secure globally and with limited acreage or miles of stream in NYS.

The Site overall is not considered to contain significantly high quality natural vegetative communities. Overall habitat quality is better described as marginal to poor, mostly as a result of human disturbances. Furthermore, predominant vegetative species at the Site (*i.e.*, common reed and common buckthorn) are commonly identified for disturbed areas and are considered invasive species for Onondaga County. However, the vegetative communities appear to provide substantial cover and forage opportunities for various guilds of resident and transient wildlife.

Sample plots were selected within each covertype to collect quantitative data concerning the vegetative species inhabiting the wetlands of the Site and areas adjacent to Harbor Brook and Drainage Ditch D/E. Relative frequency, relative density and relative dominance were derived from the data analysis and used to calculate species-specific importance values per vegetative layer (herbaceous, shrub and tree layers). The data collected determined that the most dominant species in the herbaceous layer was common reed. Red-panicle dogwood and common buckthorn were the dominant species in the shrub layer, while Eastern cottonwood and box elder were the dominant species in the tree layer.

The data resulting from this effort may be used as a baseline against which proposed Site development activities can be gauged whereas, the results of future habitat enhancement projects and/or other development may be compared.

References

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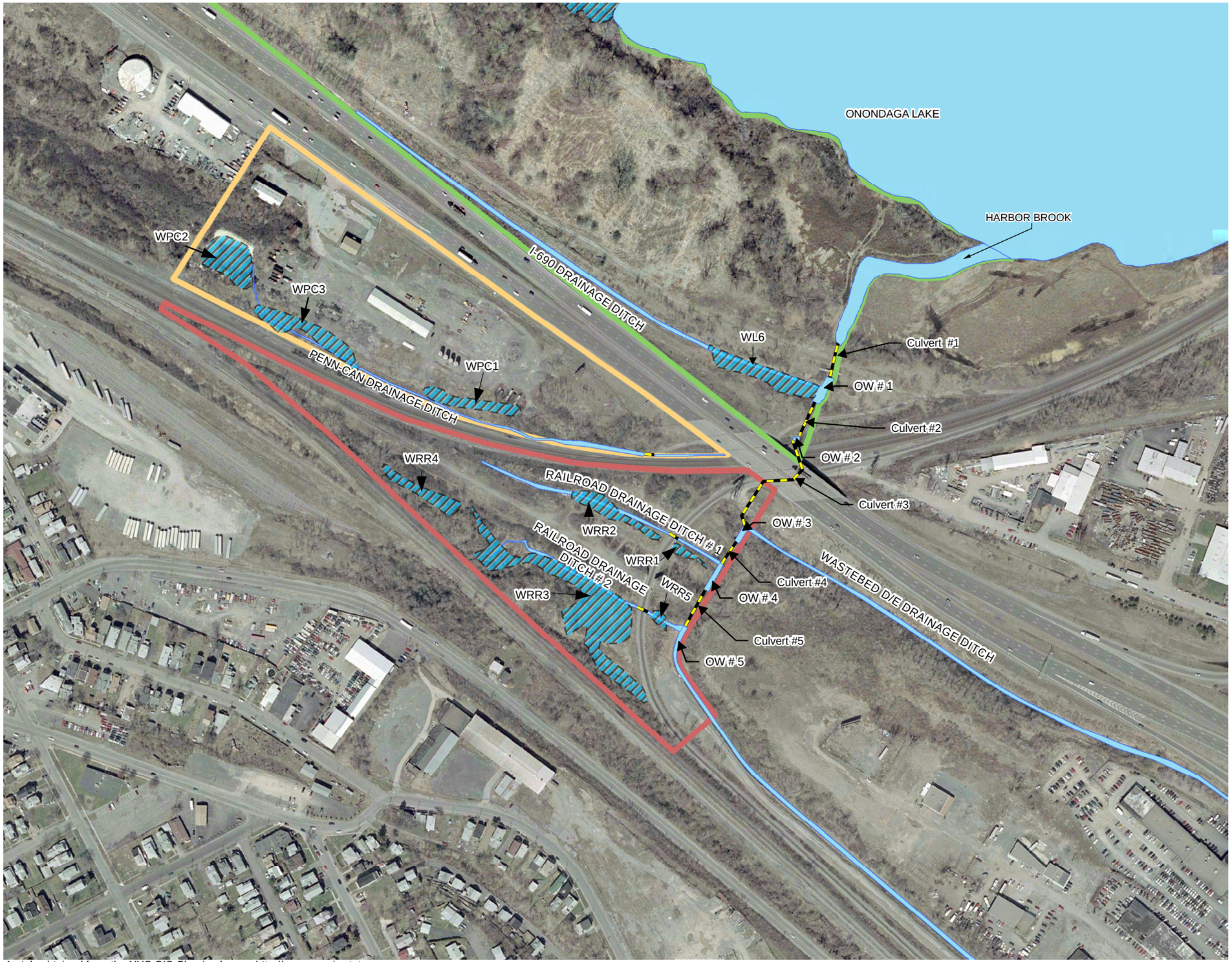
FIGURE 1



Aerials obtained from the NYS GIS Clearing house: http://www.nysgis.state.ny.us.
This document was developed in color. Reproduction in B/W may not represent the data as intended.

NOTE: Vegetative covertype boundaries are approximate.

LEGEND

- CULVERT SECTION
- DELINEATED WETLAND

SITE BOUNDARY

- RAILROAD AREA
- LAKESHORE AREA
- PENN-CAN PROPERTY

HONEYWELL
UPPER HARBOR BROOK
PRE-DESIGN INVESTIGATION
GEDDES AND SYRACUSE, NY

SITE PLAN

0 100 200 400
Feet

AUGUST 2008
1163. 42071

O'BRIEN & GERE

PLOT DATE: 6/19/08 DIV 071 SJZ