Hydrodynamic and Hydrologic Characteristics of Tampa Bay

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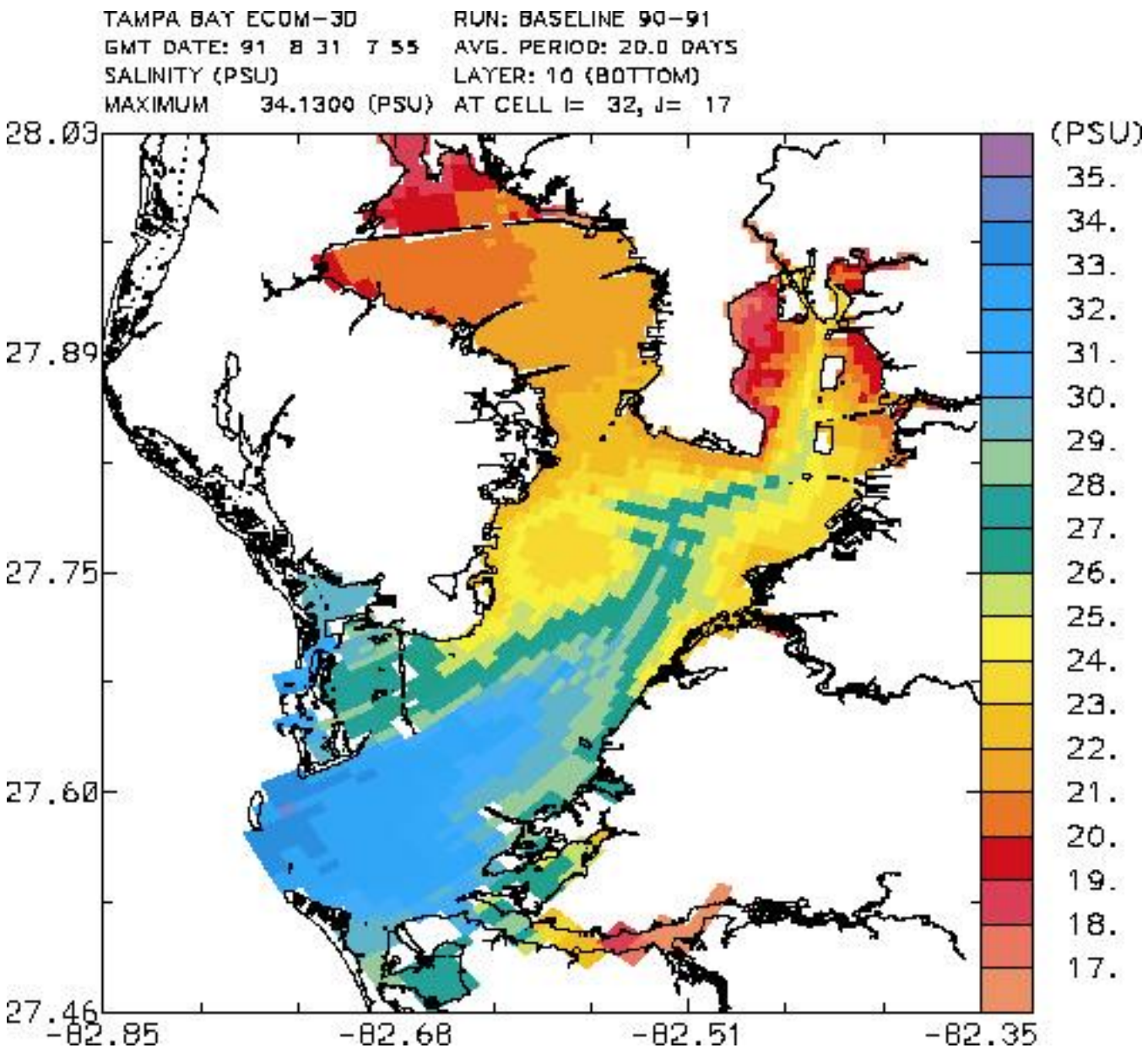
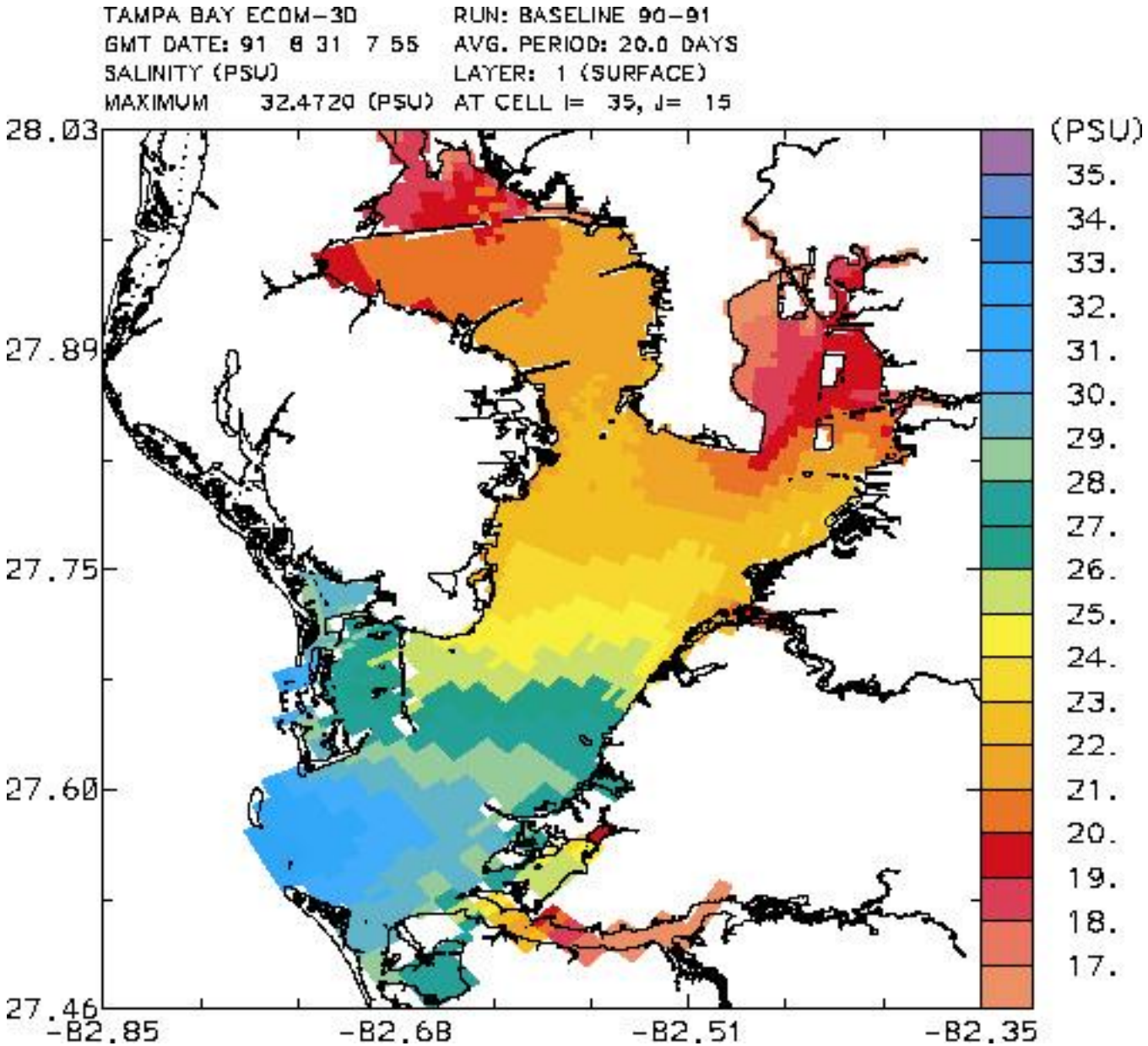
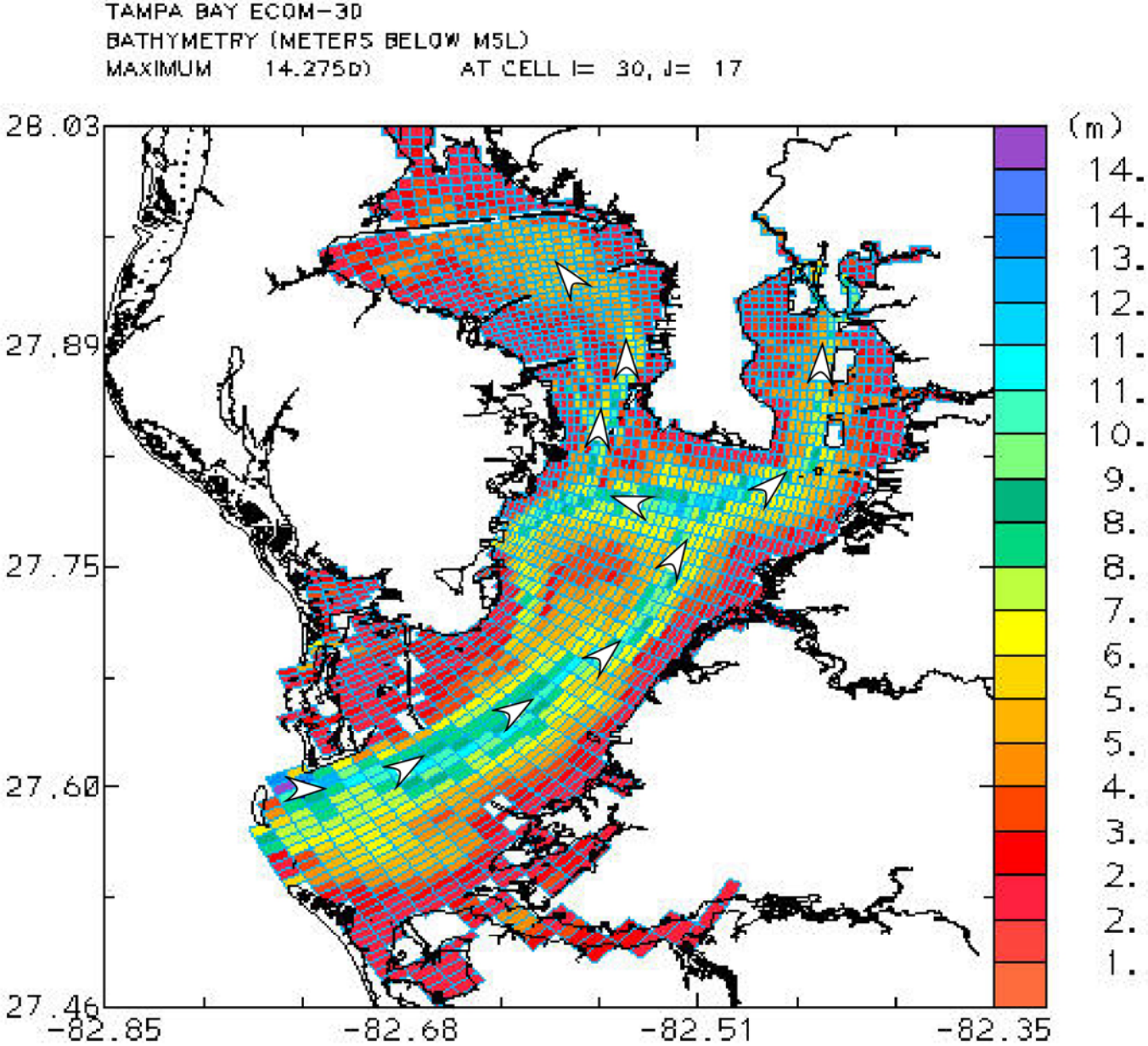
and Mike Heyl
Southwest Florida Water Management District

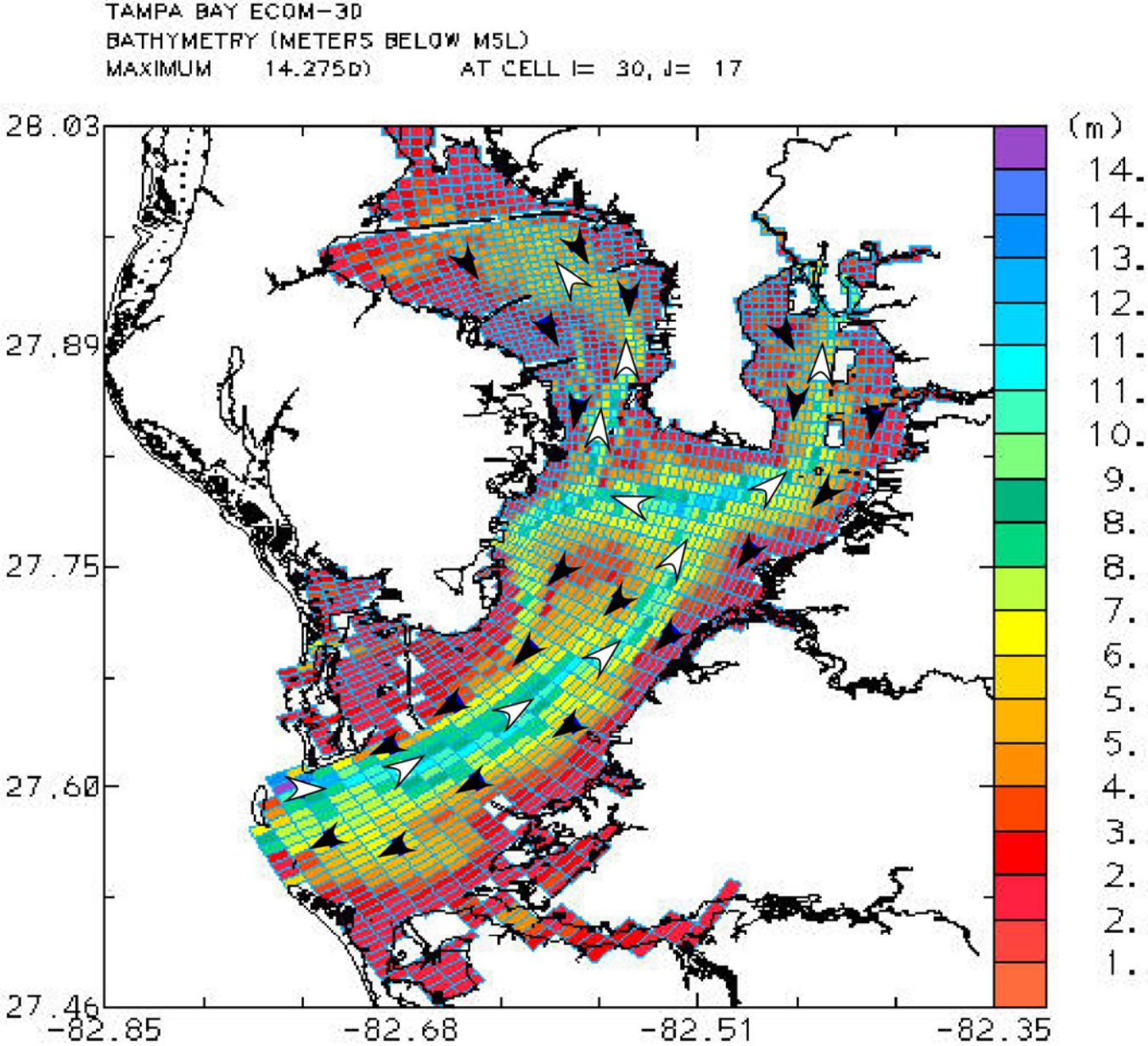
Average Bottom Salinity for August 31, 1991



Average Surface Salinity for August 31, 1991




TAMPA BAY ECOM-3D
BATHYMETRY (METERS BELOW MSL)
MAXIMUM 14.275D) AT CELL I= 30, J= 17
28.03
27.89
27.75
27.60
27.46
-82.85
-82.68
-82.51
-82.35
(m)
14.
14.
13.
12.
11.
11.
10.
9.
8.
8.
7.
6.
5.
5.
4.
3.
2.
2.
1.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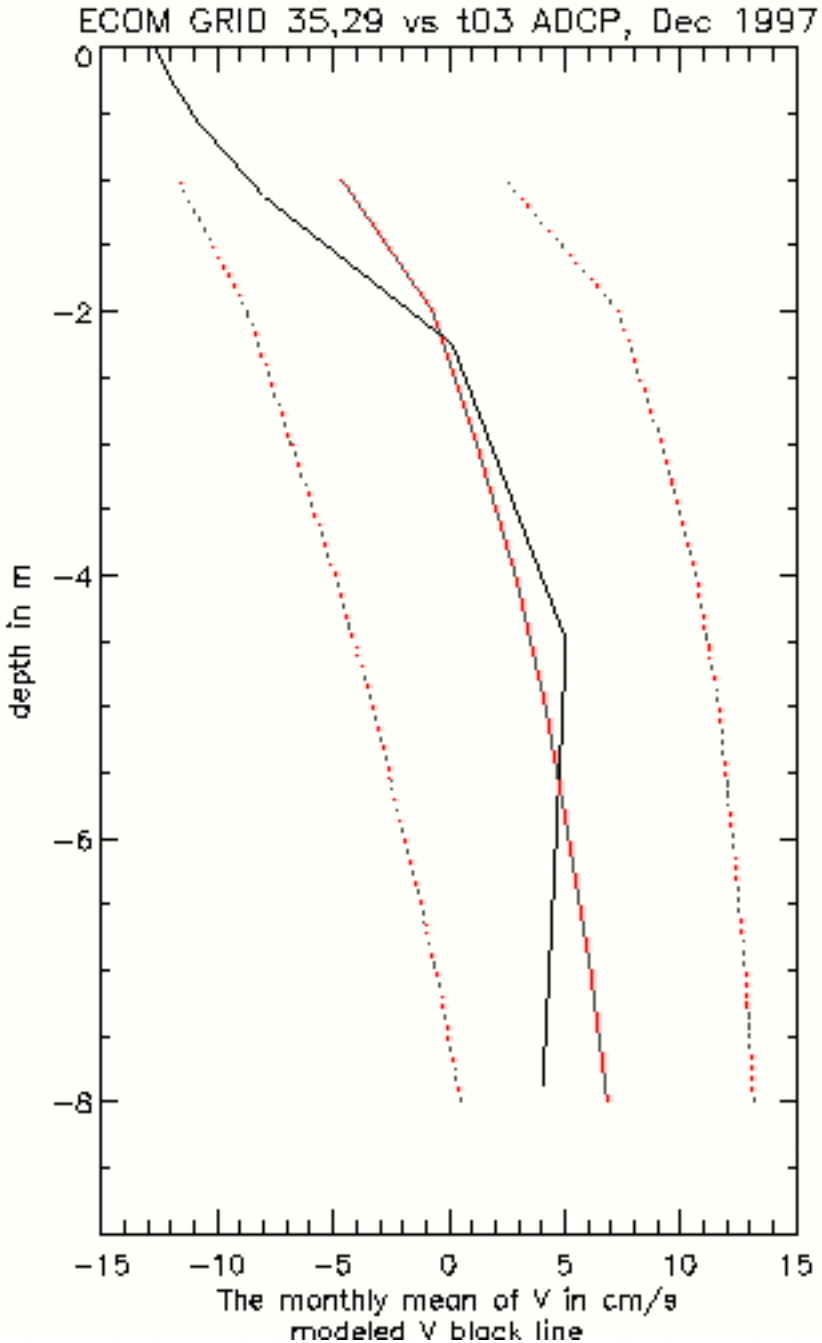
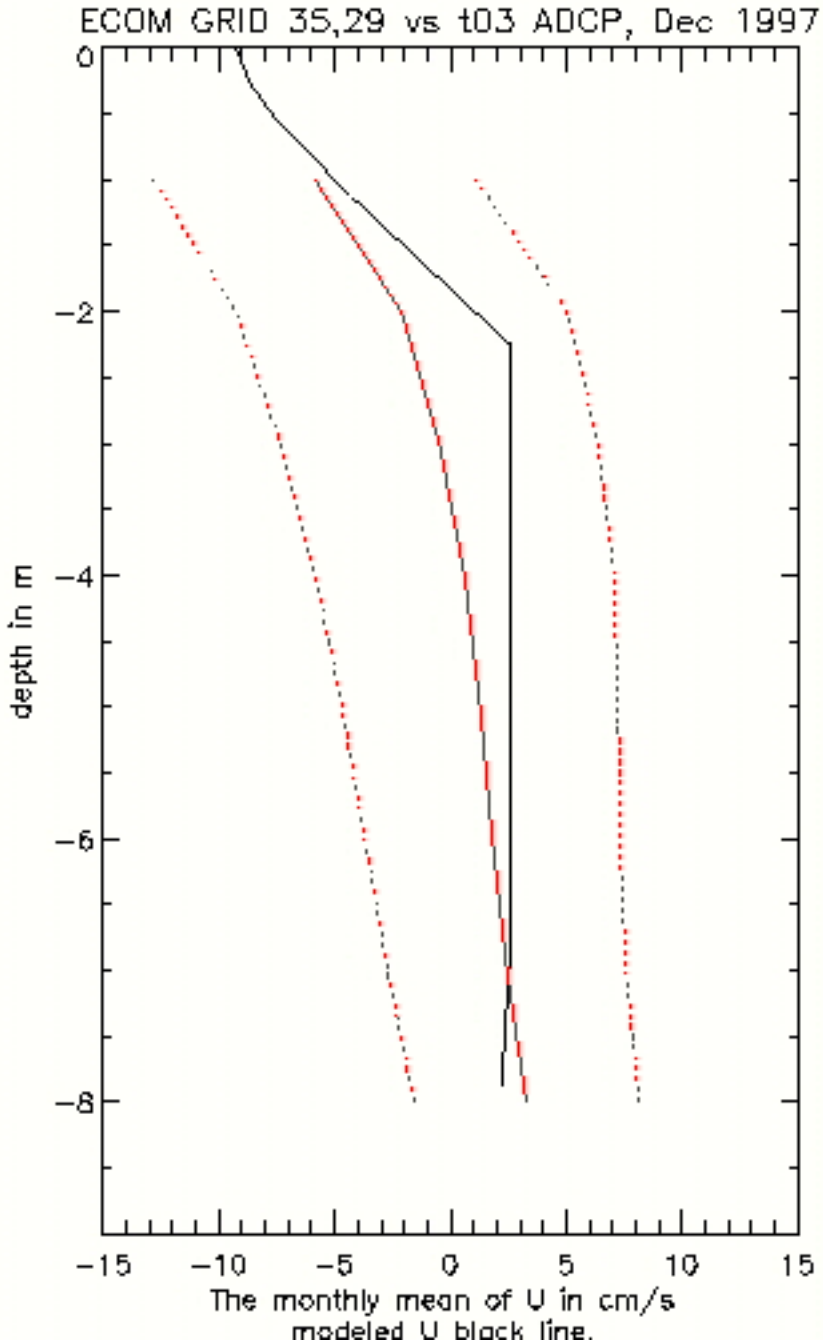
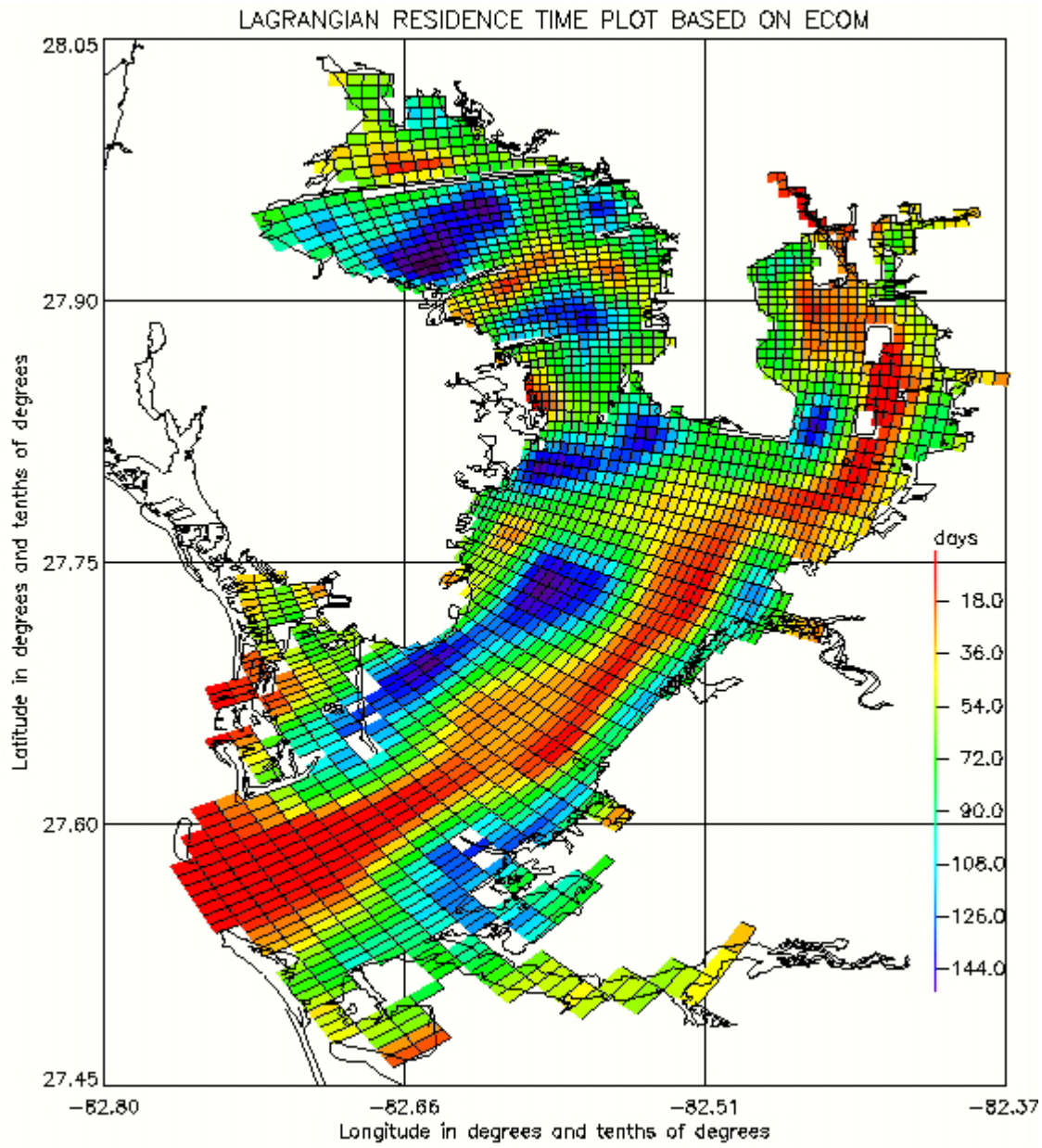
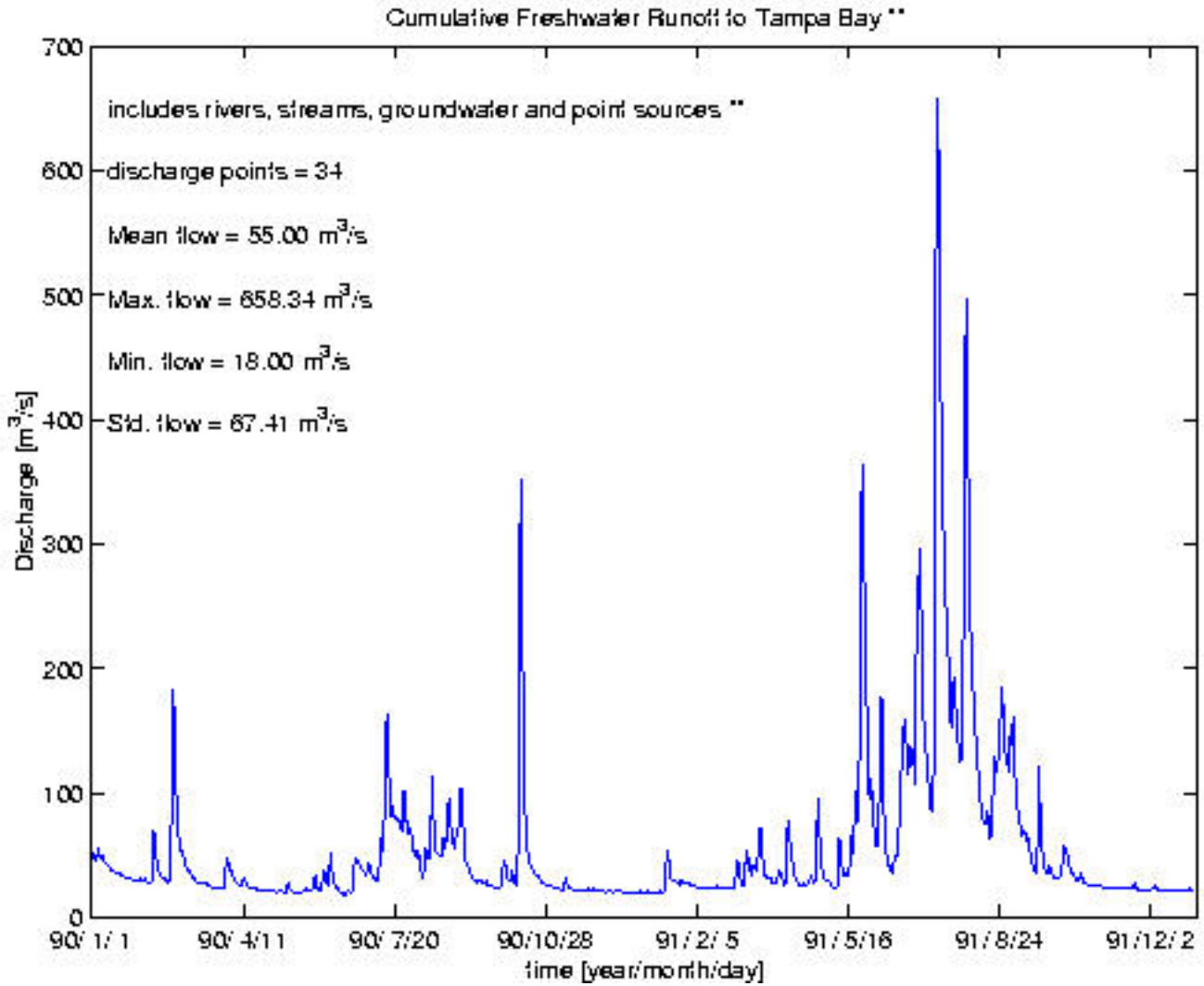
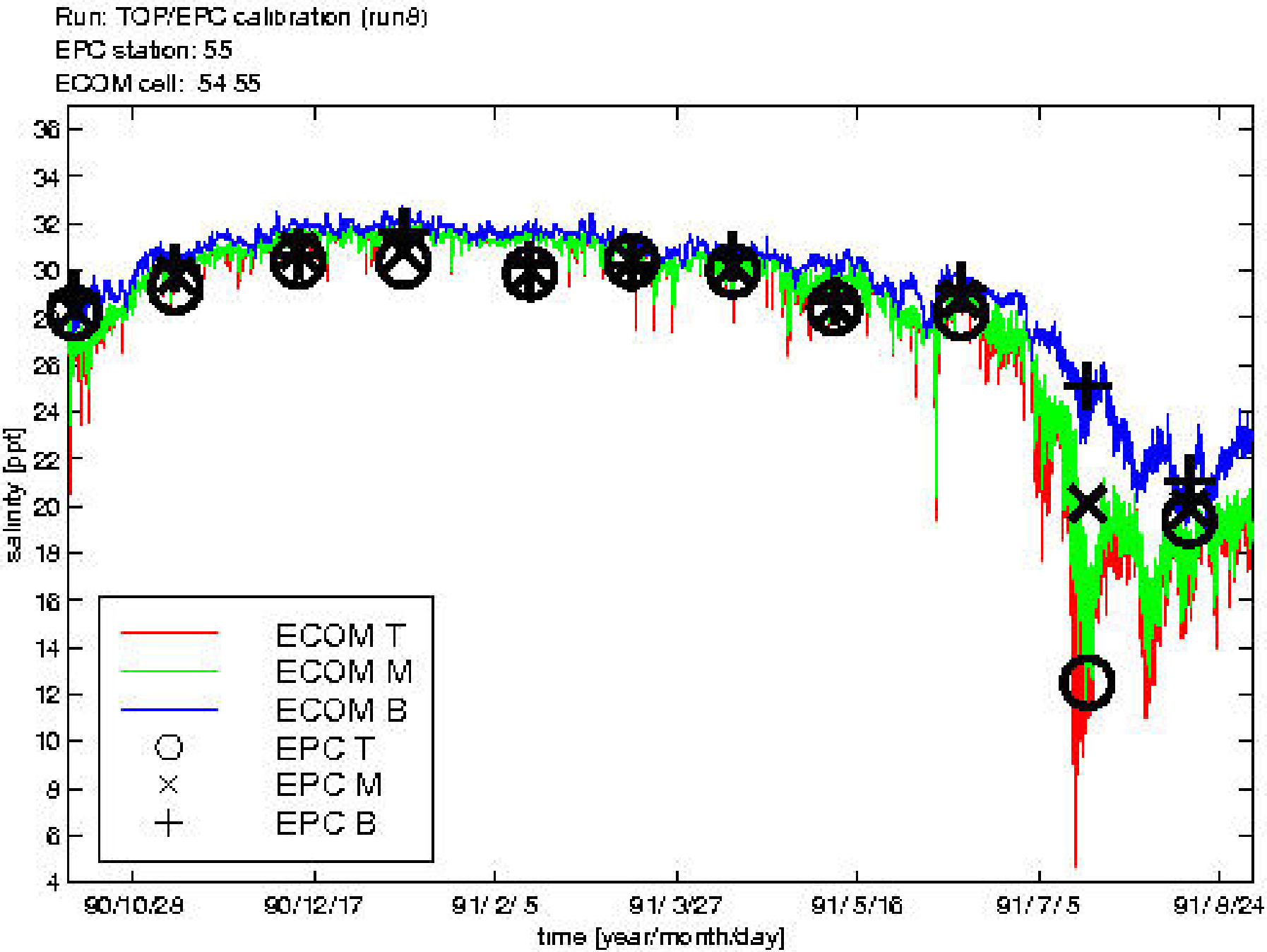
(m)
14.
14.
13.
12.
11.
11.
10.
9.
8.
8.
7.
6.
5.
5.
4.
3.
2.
2.
1.

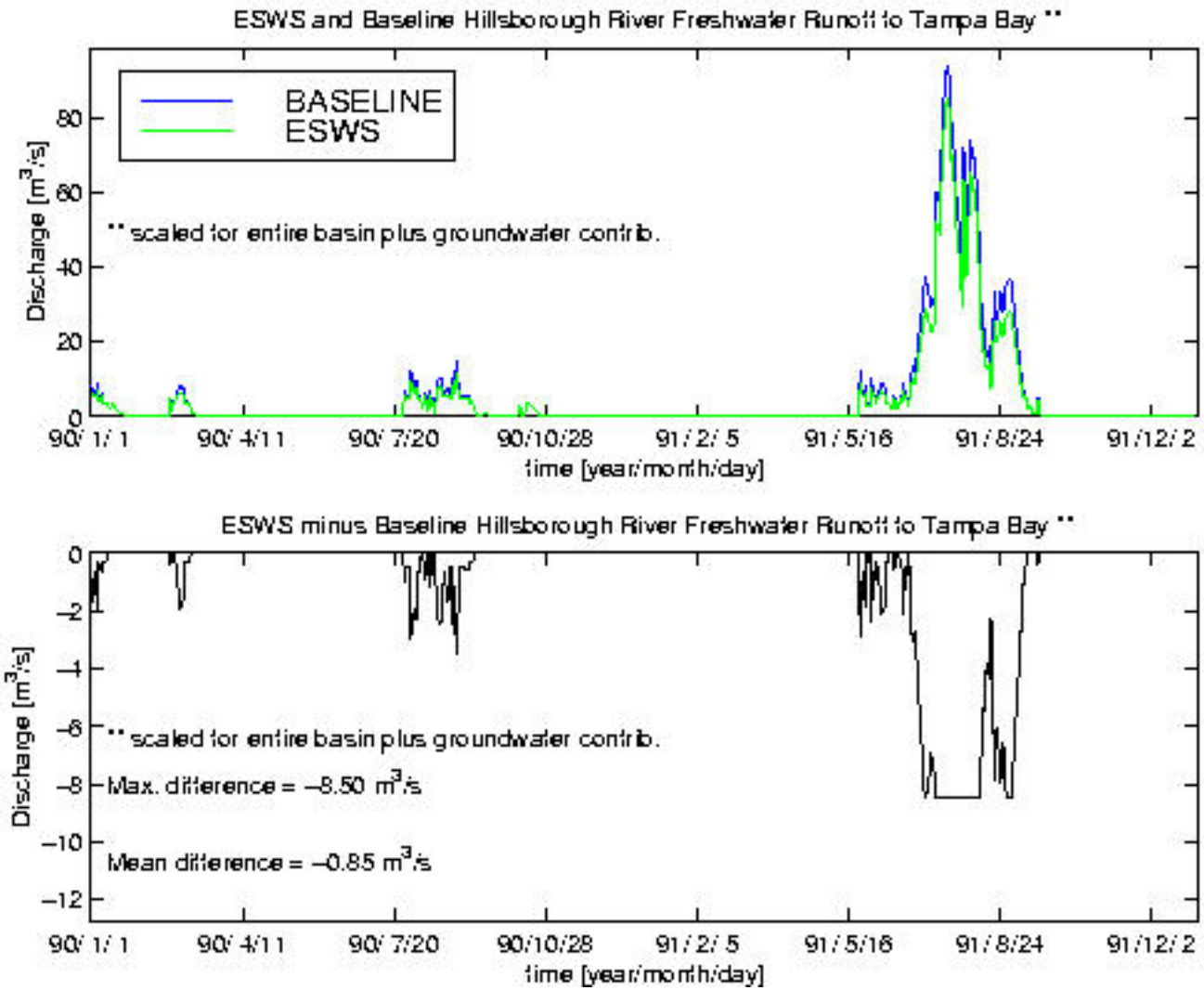

ECOM GRID 35,29 vs t03 ADCP, Dec 1997
depth in m
0
-2
-4
-6
-8
-15
-10
-5
0
5
10
15
The monthly mean of V in cm/s
modeled V black line


ECOM GRID 35,29 vs t03 ADCP, Dec 1997
depth in m
0
-2
-4
-6
-8
-15
-10
-5
0
5
10
15
The monthly mean of U in cm/s
modeled U black line.

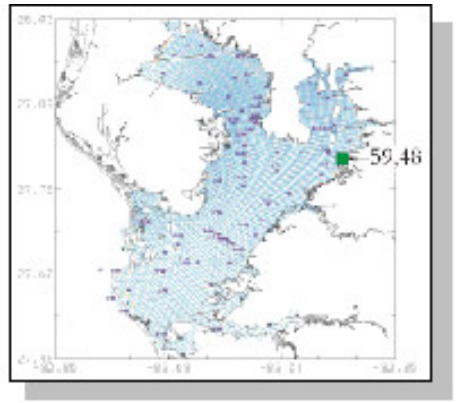

LAGRANGIAN RESIDENCE TIME PLOT BASED ON ECOM
28.05
27.90
27.75
27.60
27.45
Latitude in degrees and tenths of degrees
−82.80
−82.66
−82.51
−82.37
Longitude in degrees and tenths of degrees
days
18.0
36.0
54.0
72.0
90.0
108.0
126.0
144.0


Cumulative Freshwater Runoff to Tampa Bay **
includes rivers, streams, groundwater and point sources **
discharge points = 34
Mean flow = 55.00 m3/s
Max. flow = 658.34 m3/s
Min. flow = 18.00 m3/s
Std. flow = 67.41 m3/s
Discharge [m3/s]
0
100
200
300
400
500
600
700
90/ 1/ 1
90/ 4/11
90/ 7/20
90/10/28
91/ 2/ 5
91/ 5/16
91/ 8/24
91/12/ 2
time [year/month/day]


Run: TOP/EPC calibration (run8)
EPC station: 55
ECOM cell: 54 55
salinity [ppt]
36
34
32
30
28
26
24
22
20
18
16
14
12
10
8
6
4
90/10/29
90/12/17
91/ 2/ 5
91/ 3/27
91/ 5/16
91/ 7/ 5
91/ 8/24
time [year/month/day]
ECOM T
ECOM M
ECOM B
EPC T
EPC M
EPC B

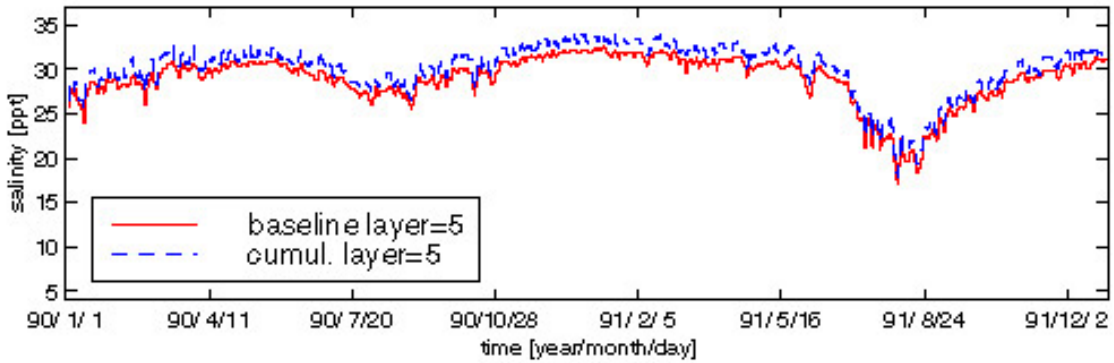

ESWS and Baseline Hillsborough River Freshwater Runoff to Tampa Bay **
BASELINE
ESWS
** scaled for entire basin plus groundwater contrib.
Discharge [m3/s]
0
20
40
60
80
90/ 1/ 1
90/ 4/11
90/ 7/20
90/10/28
91/ 2/ 5
91/ 5/16
91/ 8/24
91/12/ 2
time [year/month/day]
ESWS minus Baseline Hillsborough River Freshwater Runoff to Tampa Bay **
** scaled for entire basin plus groundwater contrib.
Max. difference = –8.50 m3/s
Mean difference = –0.85 m3/s
Discharge [m3/s]
0
–2
–4
–6
–8
–10
–12
90/ 1/ 1
90/ 4/11
90/ 7/20
90/10/28
91/ 2/ 5
91/ 5/16
91/ 8/24
91/12/ 2
time [year/month/day]

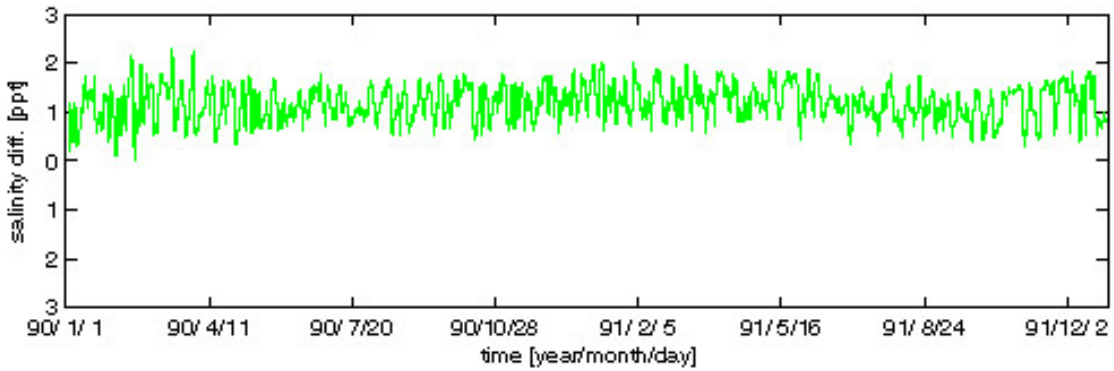
Big Bend Discharge



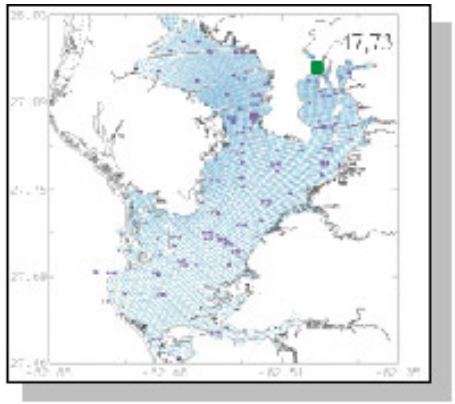
Runs: 9091 Baseline vs. Cumul .
ECOM cell: 59 48

Station Max. Mean Diff. 1.363 ppt
Station Max. Range 17.303 ppt
Change of Max. Sal. 2.125 ppt
Change of Min. Sal. 1.018 ppt



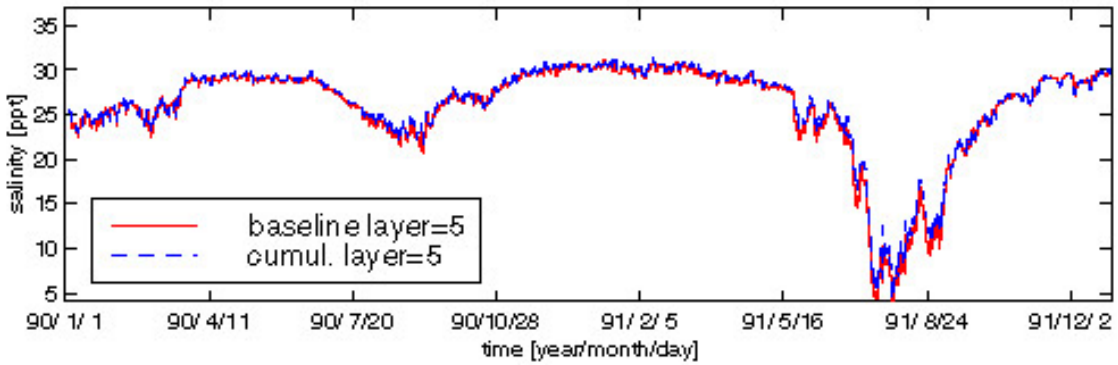


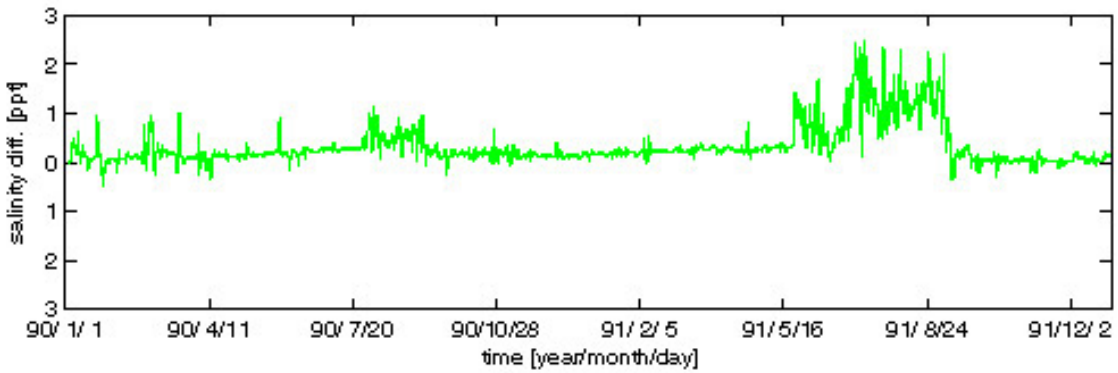
EPC Station 2

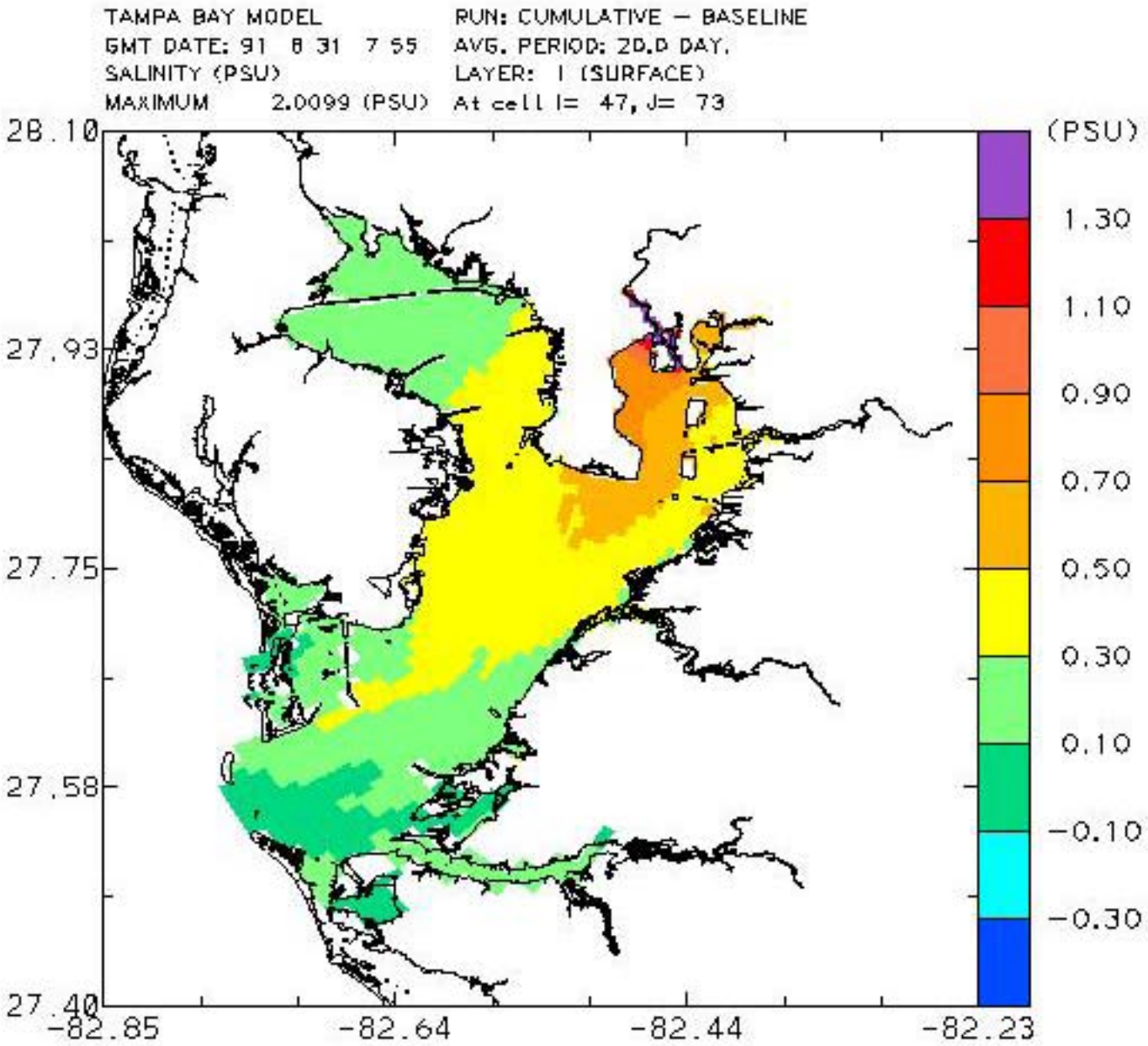


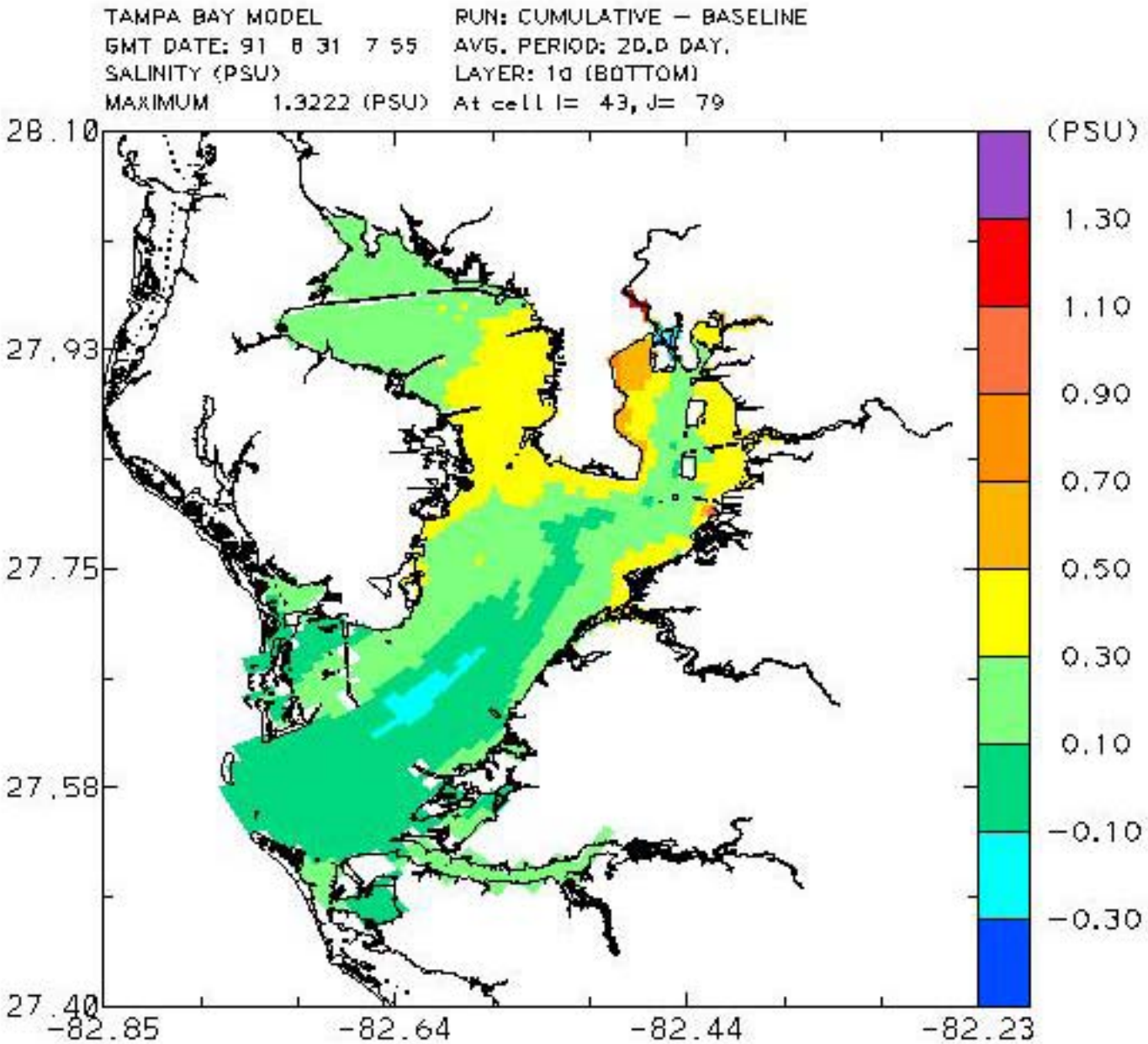
Runs: 9091 Baseline vs. Cumul .
ECOM cell: 47 73

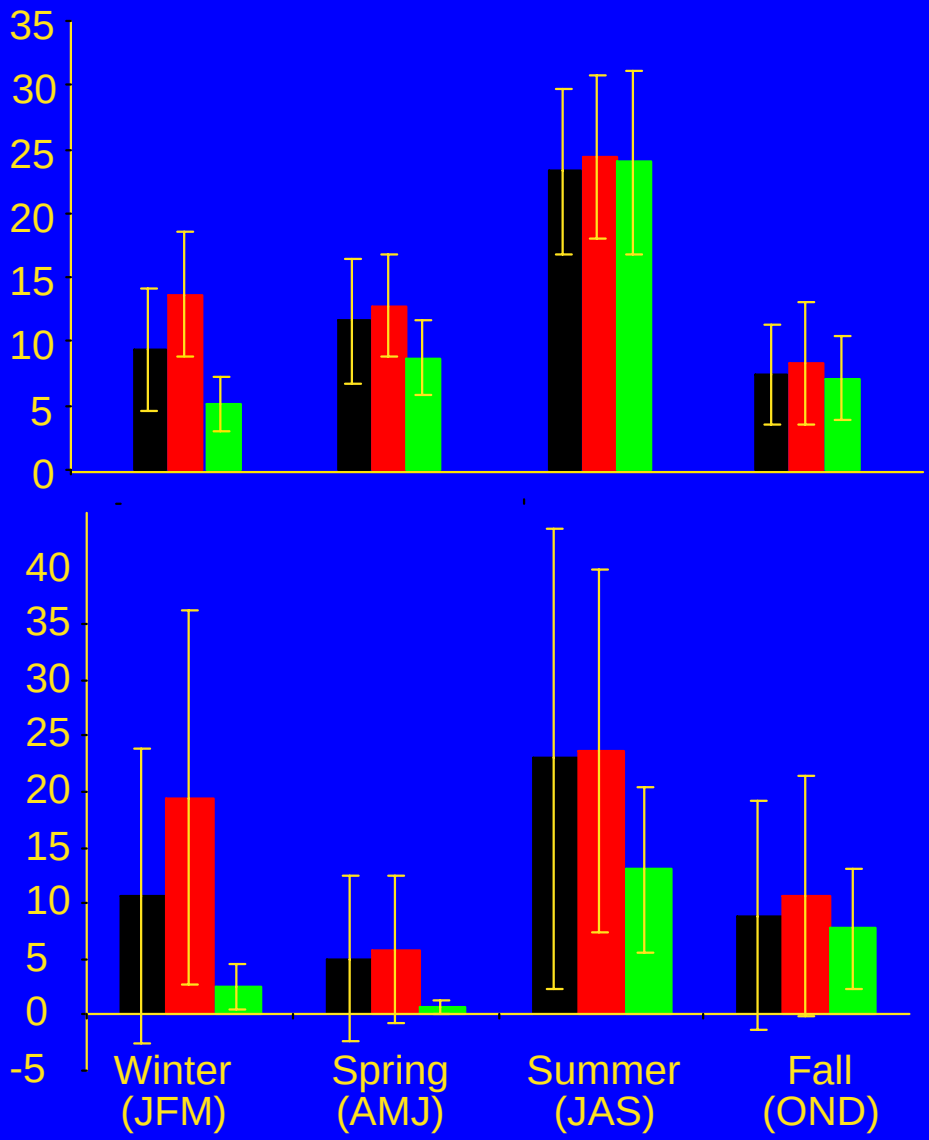
Station Max. Mean Diff. 0.380 ppt
Station Max. Range 33.961 ppt
Change of Max. Sal. 0.204 ppt
Change of Min. Sal. 1.651 ppt






TAMPA BAY MODEL
GMT DATE: 91 8 31 7 55
SALINITY (PSU)
MAXIMUM 2.0099 (PSU)
RUN: CUMULATIVE – BASELINE
AVG. PERIOD: 20.0 DAY.
LAYER: 1 (SURFACE)
At cell I= 47, J= 73
28.10
27.93
27.75
27.58
27.40
-82.85
-82.64
-82.44
-82.23
(PSU)
1.30
1.10
0.90
0.70
0.50
0.30
0.10
-0.10
-0.30


TAMPA BAY MODEL
GMT DATE: 91 8 31 7 55
SALINITY (PSU)
MAXIMUM 1.3222 (PSU)
RUN: CUMULATIVE – BASELINE
AVG. PERIOD: 20.0 DAY.
LAYER: 10 (BOTTOM)
At cell I= 43, J= 79
28.10
27.93
27.75
27.58
27.40
-82.85
-82.64
-82.44
-82.23
(PSU)
1.30
1.10
0.90
0.70
0.50
0.30
0.10
-0.10
-0.30



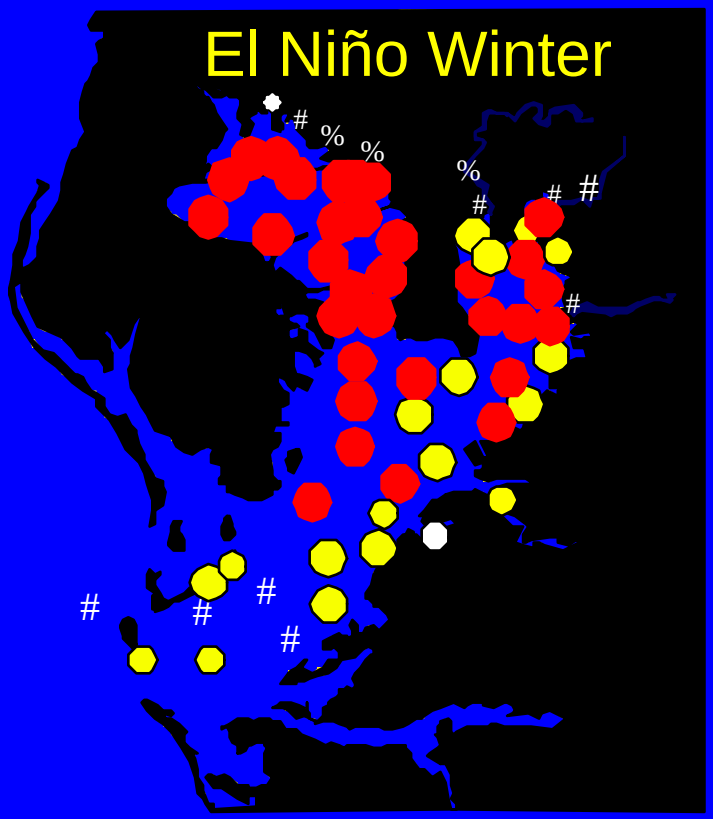
Tampa Bay area Precipitation (in.)

- 50-y mean
- El Niño mean, 1950–99
- La Niña mean, 1950–99

Hillsborough River Discharge (m^3s^{-1})

- 50-y mean
- El Niño mean, 1950–99
- La Niña mean, 1950–99

Salinity and El Niño winter conditions



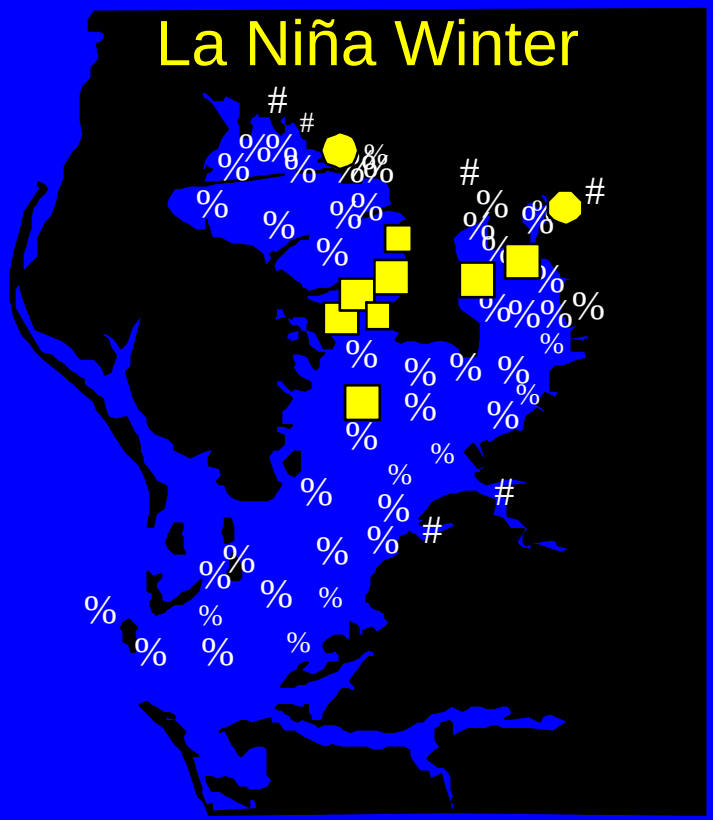
Correlation ranges

-0.450--0.649
-0.300--0.449
-0.150--0.299
0.000--0.149

0.450-0.649
0.300-0.449
0.150-0.299
0.000-0.149

>99%
95–99%
not significant

Salinity and La Niña winter conditions



Correlation ranges

-0.450--0.649

-0.300--0.449

-0.150--0.299

0.000--0.149

0.450-0.649

0.300-0.449

0.150-0.299

0.000-0.149

>99%

95–99%

not significant

Salinity and La Niña spring conditions

Correlation ranges

-0.450--0.649

-0.300--0.449

-0.150--0.299

0.000--0.149

0.450-0.649

0.300-0.449

0.150-0.299

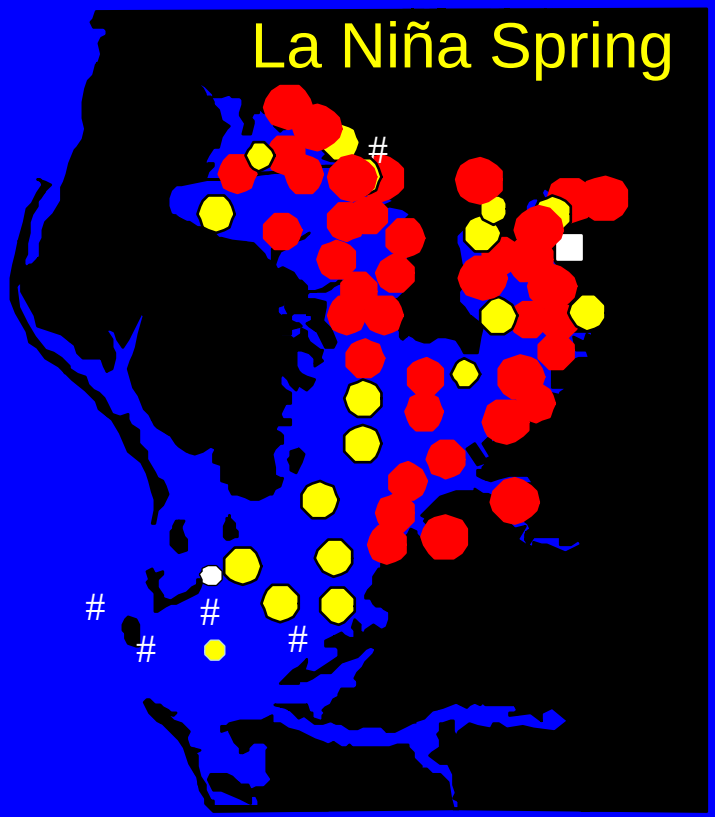
0.000-0.149

Significance levels

>99%

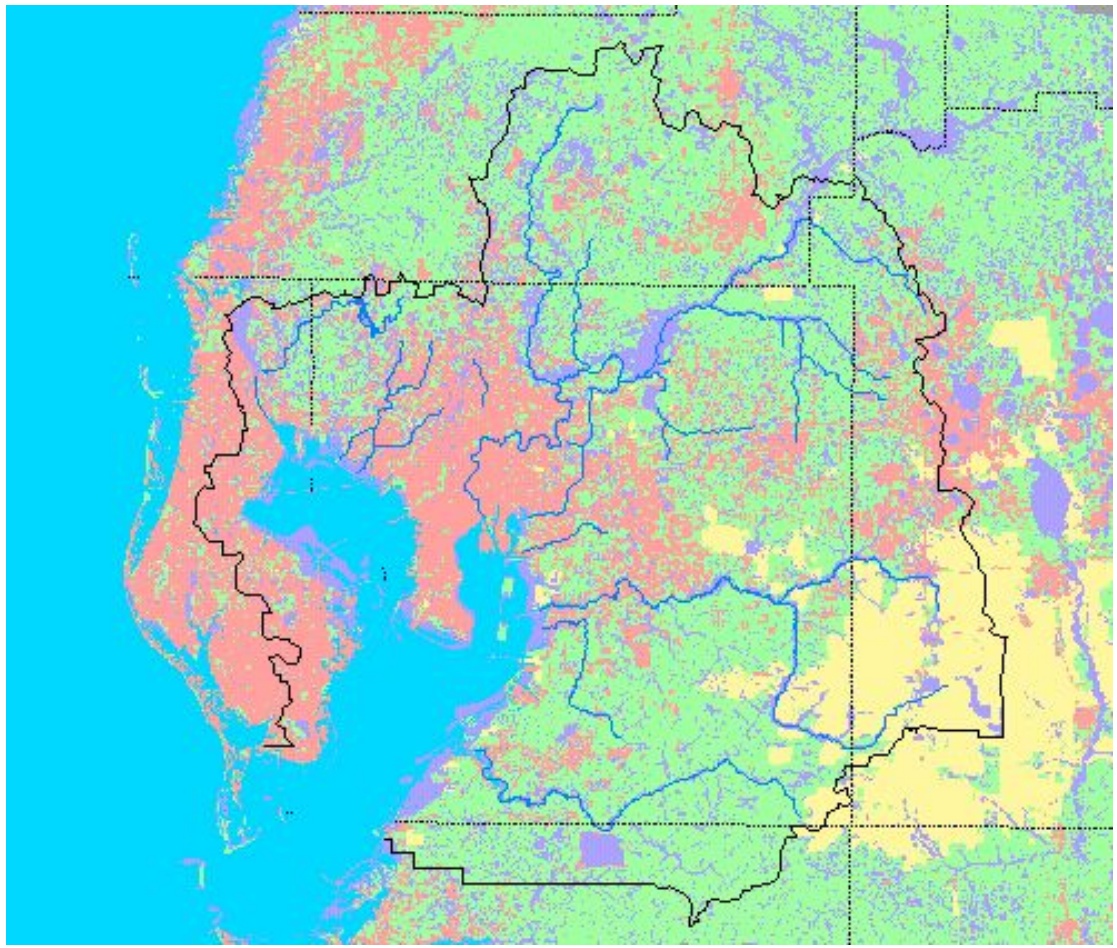
95–99%

not significant

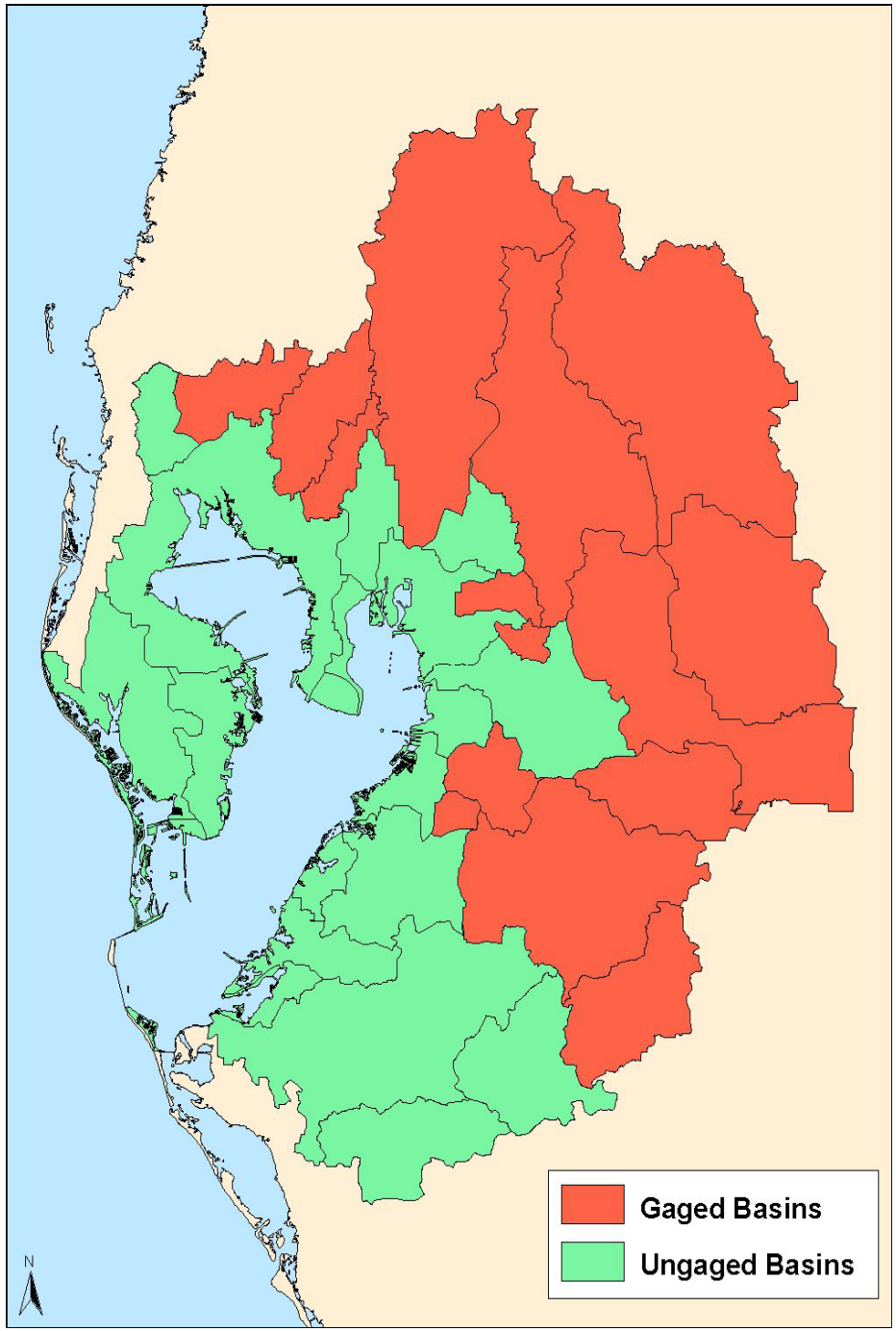


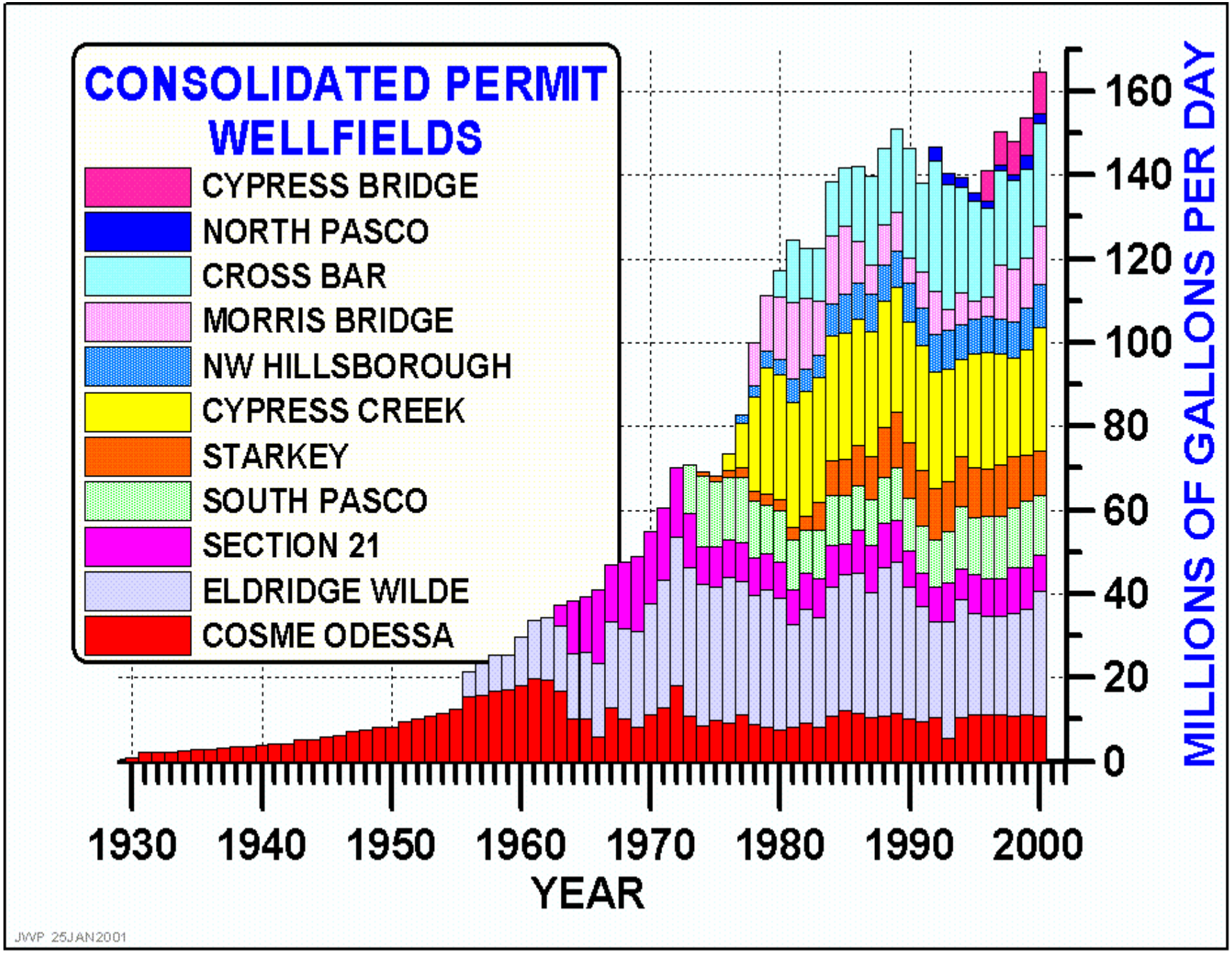
General Land Use

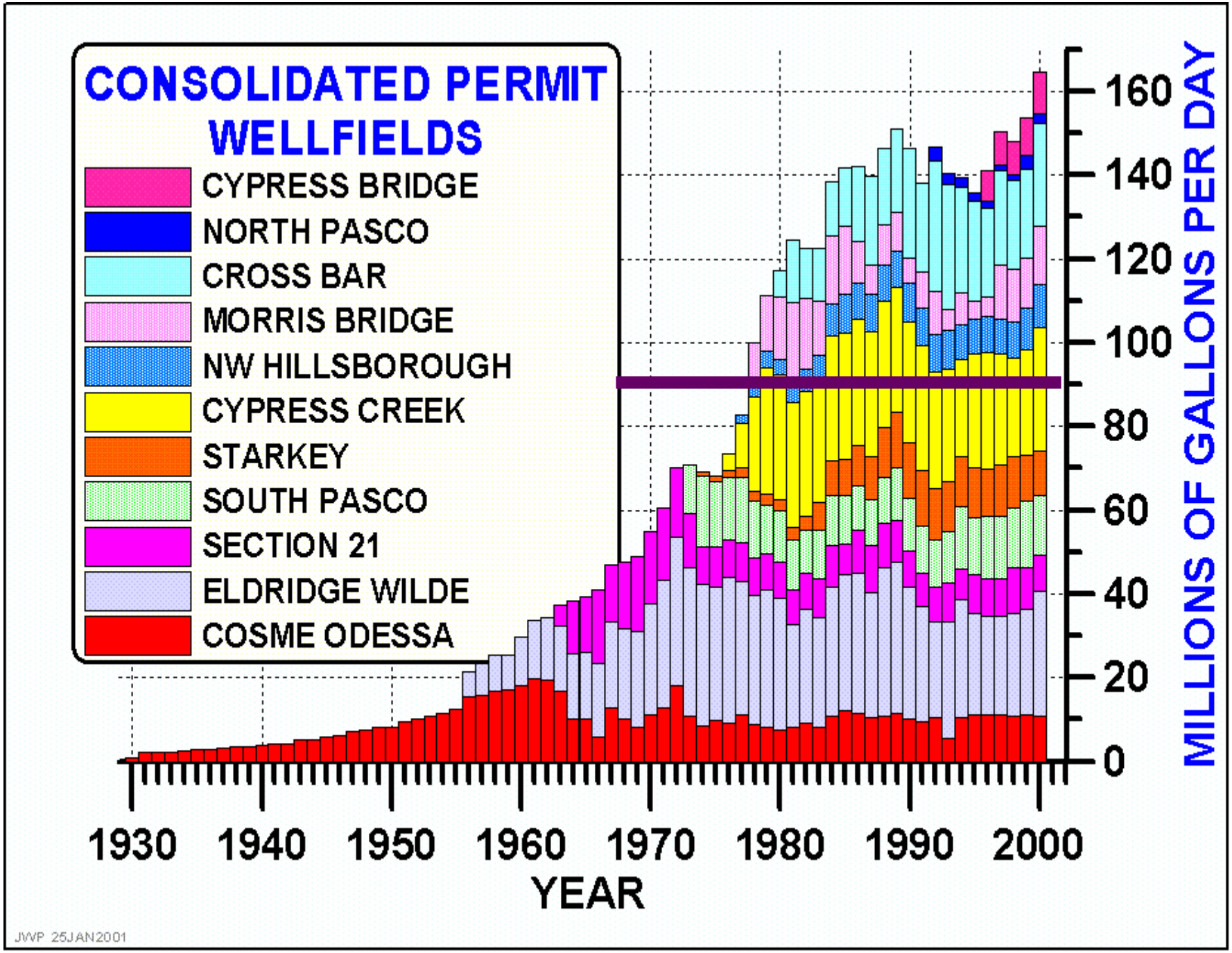
- Urban
- Ag & rural
- Wetlands & water
- Mining



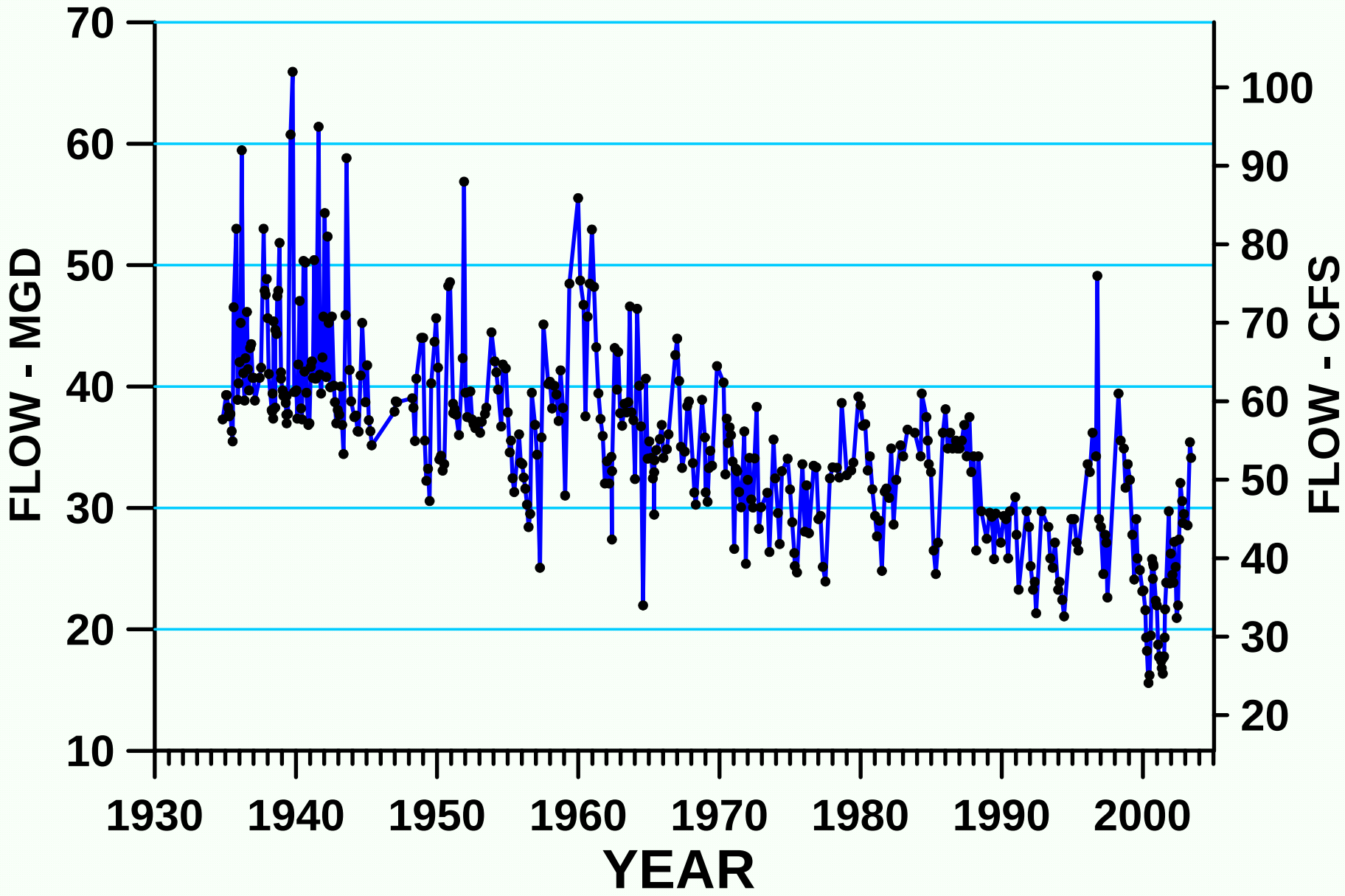
Gaged and Ungaged Basins of the Tampa Bay Watershed




CONSOLIDATED PERMIT WELLFIELDS
CYPRESS BRIDGE
NORTH PASCO
CROSS BAR
MORRIS BRIDGE
NW HILLSBOROUGH
CYPRESS CREEK
STARKEY
SOUTH PASCO
SECTION 21
ELDRIDGE WILDE
COSME ODESSA
0
20
40
60
80
100
120
140
160
MILLIONS OF GALLONS PER DAY
1930
1940
1950
1960
1970
1980
1990
2000
YEAR
JWP 25JAN2001

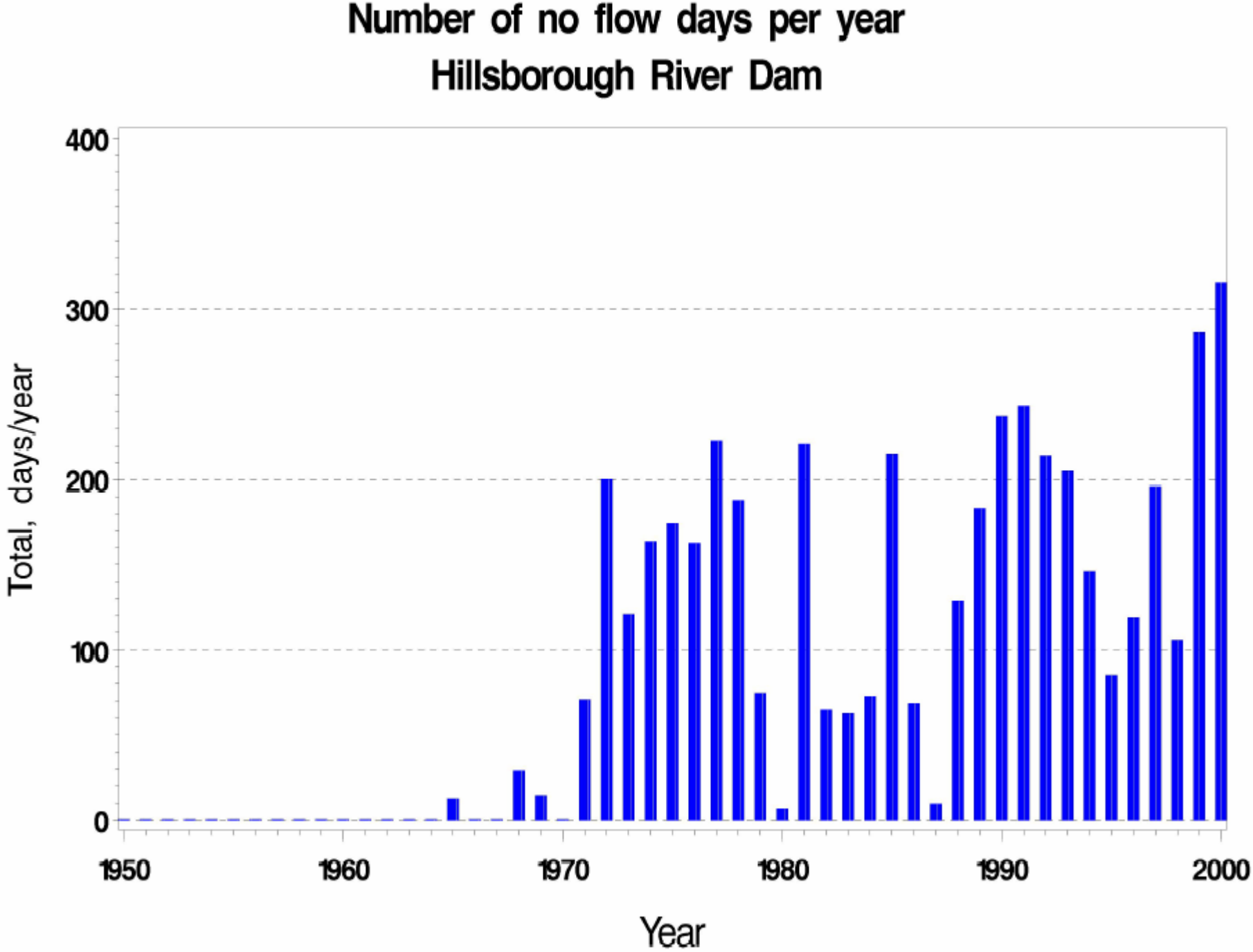

CONSOLIDATED PERMIT WELLFIELDS
CYPRESS BRIDGE
NORTH PASCO
CROSS BAR
MORRIS BRIDGE
NW HILLSBOROUGH
CYPRESS CREEK
STARKEY
SOUTH PASCO
SECTION 21
ELDRIDGE WILDE
COSME ODESSA
0
20
40
60
80
100
120
140
160
MILLIONS OF GALLONS PER DAY
1930
1940
1950
1960
1970
1980
1990
2000
YEAR
JWP 25JAN2001

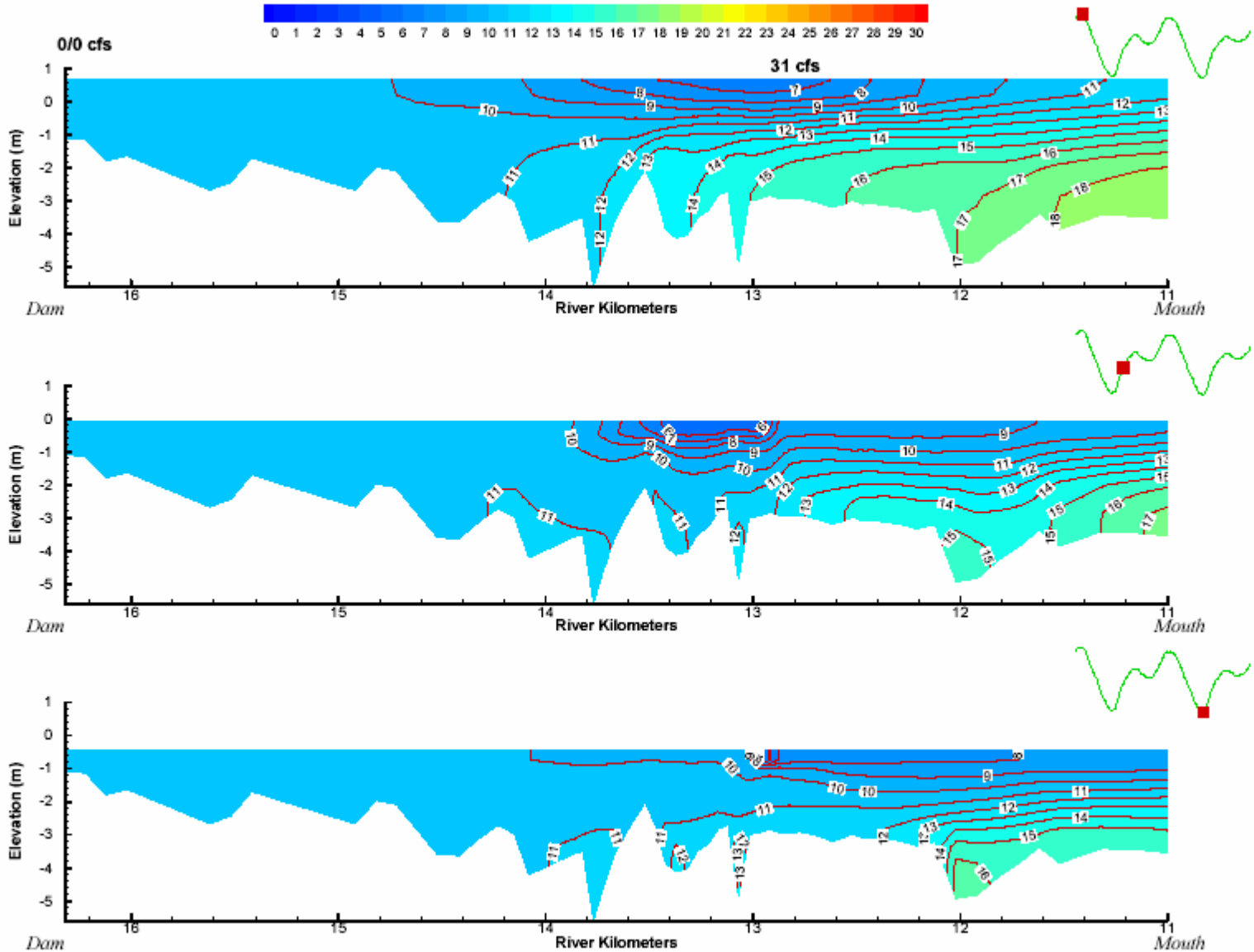
CRYSTAL SPRINGS NEAR ZEPHYRHILLS

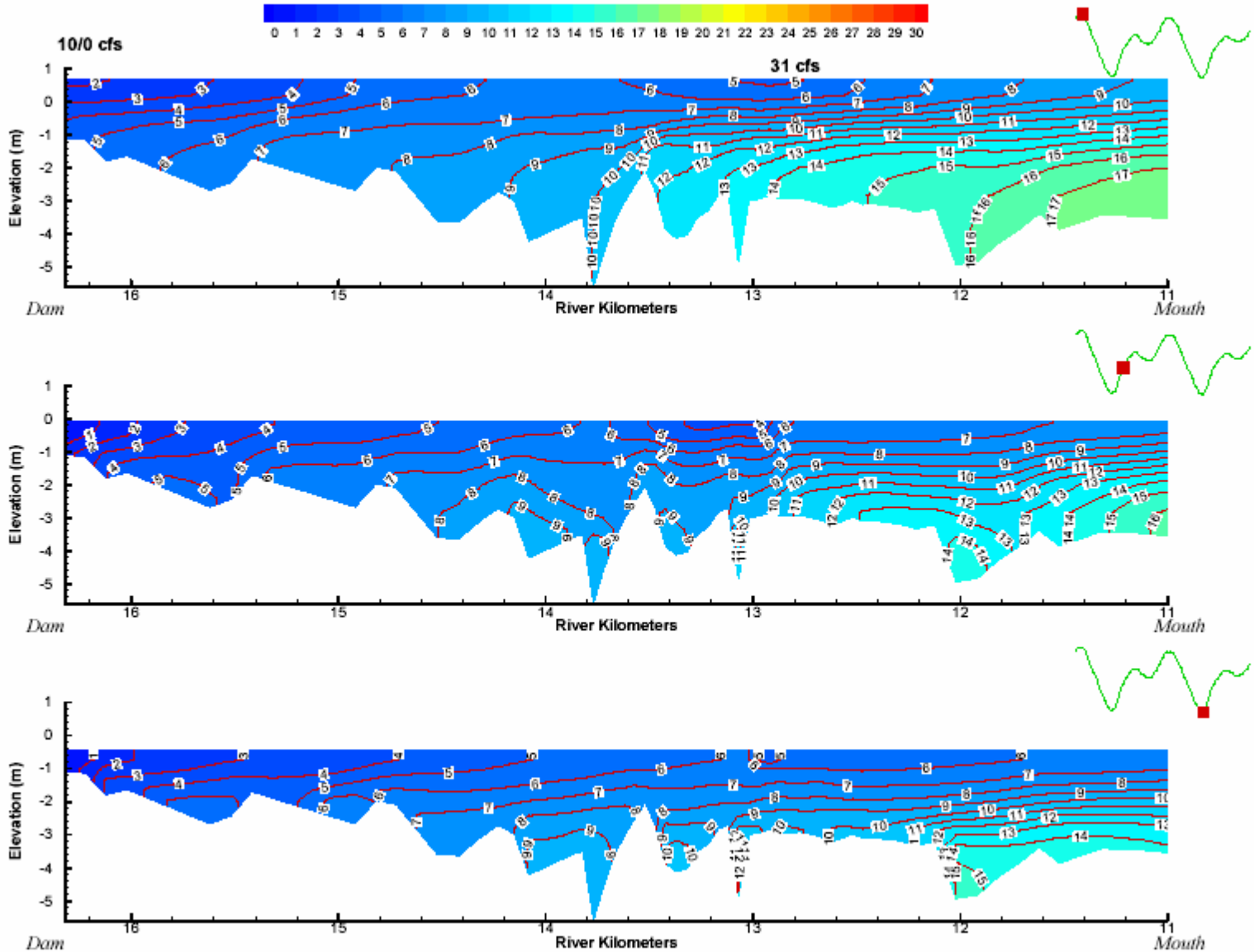


J.W. PARKER 16OCT2003
DATA THRU 31MAY2003

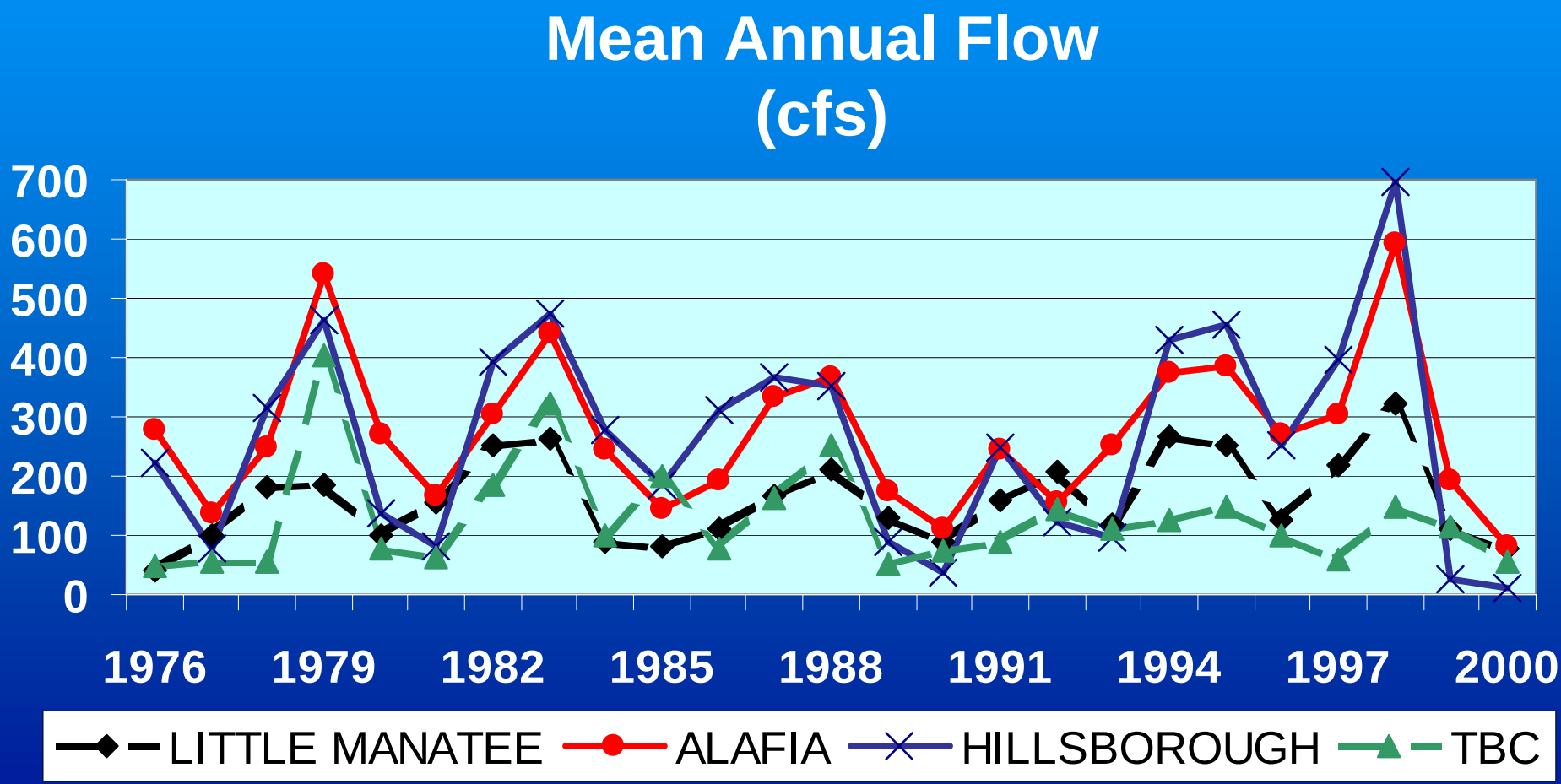
Permitted Surface Water Use


Number of no flow days per year
Hillsborough River Dam
400
300
200
100
0
Total, days/year
1950
1960
1970
1980
1990
2000
Year

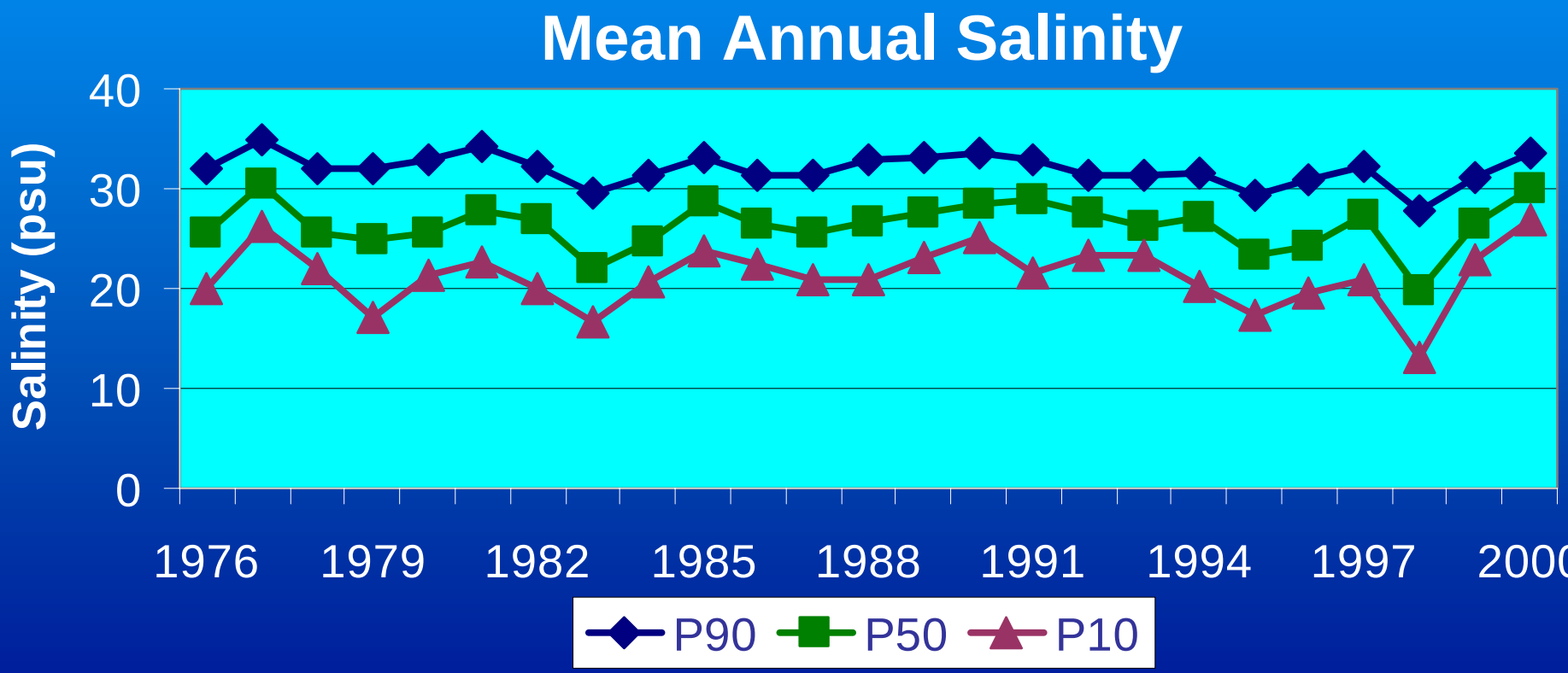

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
0/0 cfs
31 cfs
Elevation (m)
River Kilometers
Dam
Mouth

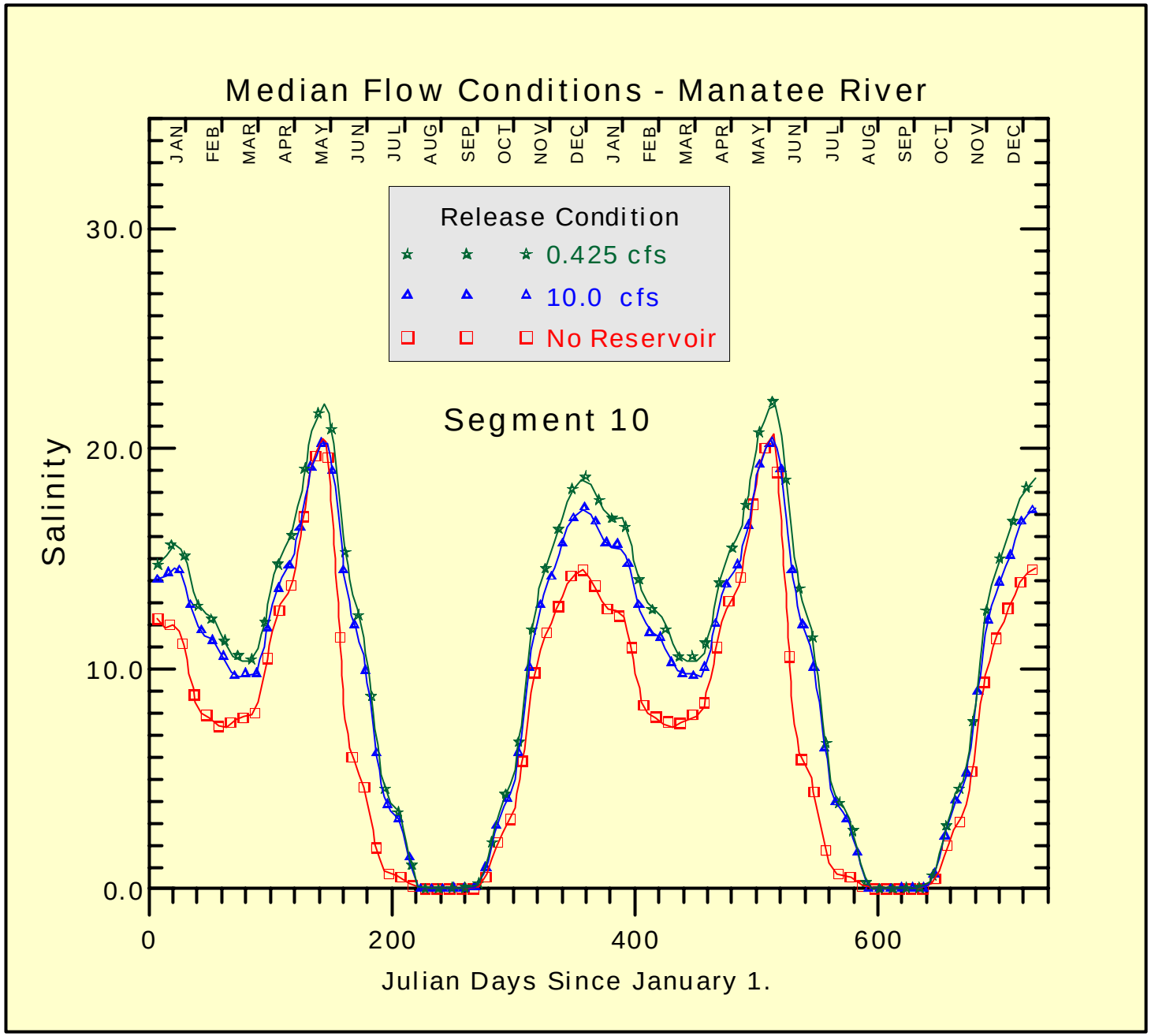

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
10/0 cfs
31 cfs
Elevation (m)
River Kilometers
Dam
Mouth
16
15
14
13
12
11

- To examine the historical trends of flow and salinity in Tampa Bay



- To examine the historical trends of flow and salinity in Tampa Bay




Median Flow Conditions - Manatee River
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
Release Condition
0.425 cfs
10.0 cfs
No Reservoir
Segment 10
Salinity
30.0
20.0
10.0
0.0
0
200
400
600
Julian Days Since January 1.