2011 Water Shortage
A Preliminary Retrospective

Peter J. Kwiatkowski, P.G.
South Florida Water Management District

South Florida Hydrologic Society
August 3, 2011

Challenges of Water Shortage Management

- You don’t know it’s coming
- You don’t know when it’s going to be over
- You can’t make it rain
- Impacts go on and on and on…..
- Options are limited
- Every decision is subject to Monday-morning quarterbacking

SFWMD Water Shortage Plan (Chapter 40E-21, F.A.C.)

- Water Shortage -- Insufficient water to meet estimated present and future demands or to protect water resources from serious harm
- Equitably distribute available supplies to all users
- Balance resource protection with economic impacts
- Provide advance knowledge of plan to promote certainty to users

Phased Restrictions

- Phase I – Moderate -- 15% cutback
- Phase II – Severe -- 30% cutback
- Phase III – Extreme – 45% cutback
- Phase IV – Critical – 60% cutback

Note: These are goals

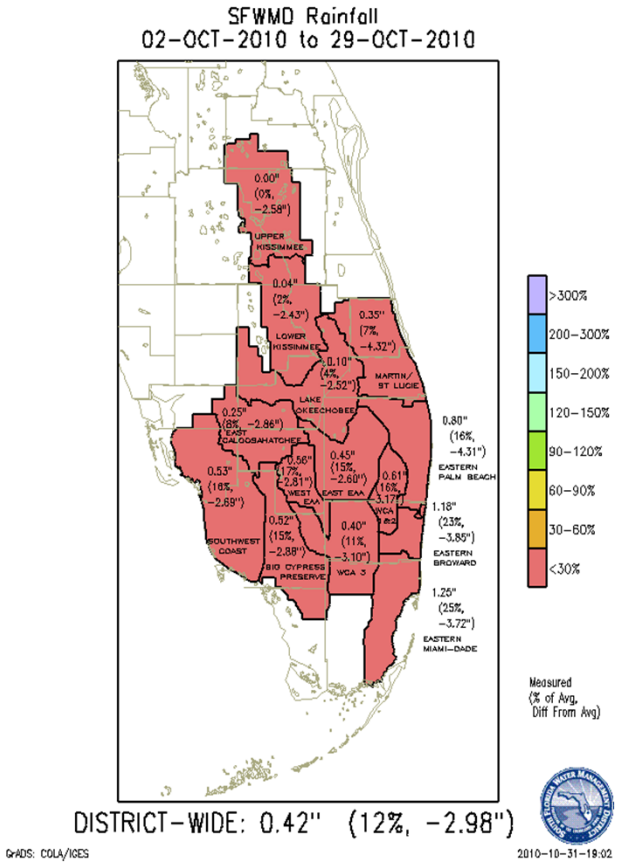
Precursors

- 2010 Wet Season – Below-Average Rainfall
- USACE makes Lake O releases to tide late in wet season
- La Nina – drier-than-normal dry season predicted for 2011

Concerns

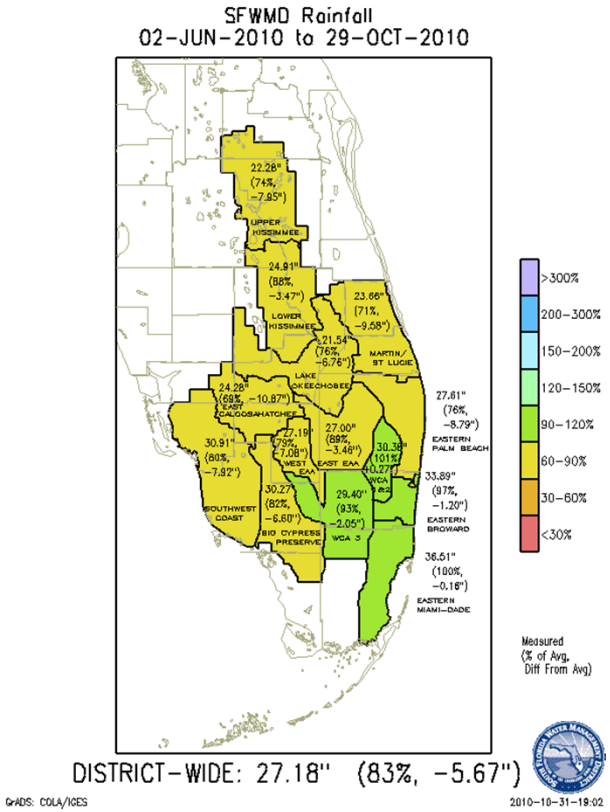
- Caloosahatchee Estuary -- salinity
- Lake Okeechobee – apple snails/snail kites, MFL
- Agriculture/Nurseries -- economic harm
- Everglades – dry out, muck fires
- Stormwater Treatment Areas – hydrated
- Wellfields – saltwater intrusion
- City of West Palm Beach – public water supply
- Health & Safety – firefighting flows

October



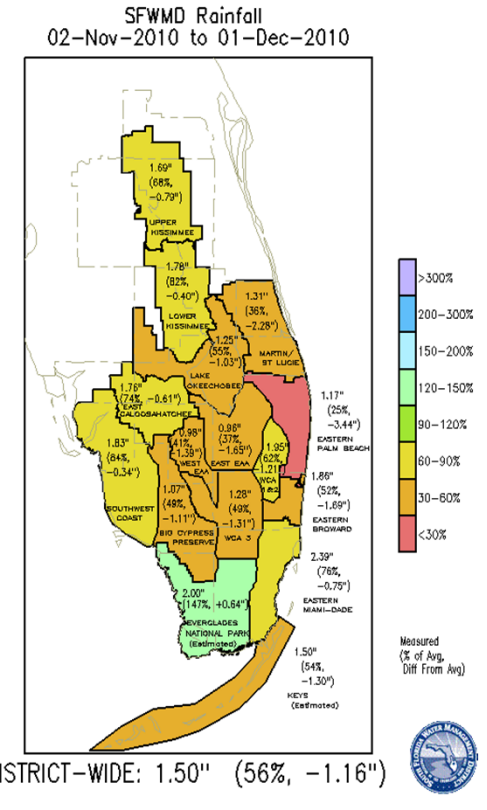
Wet Season

Up to Oct 29



November

Up to Dec 01

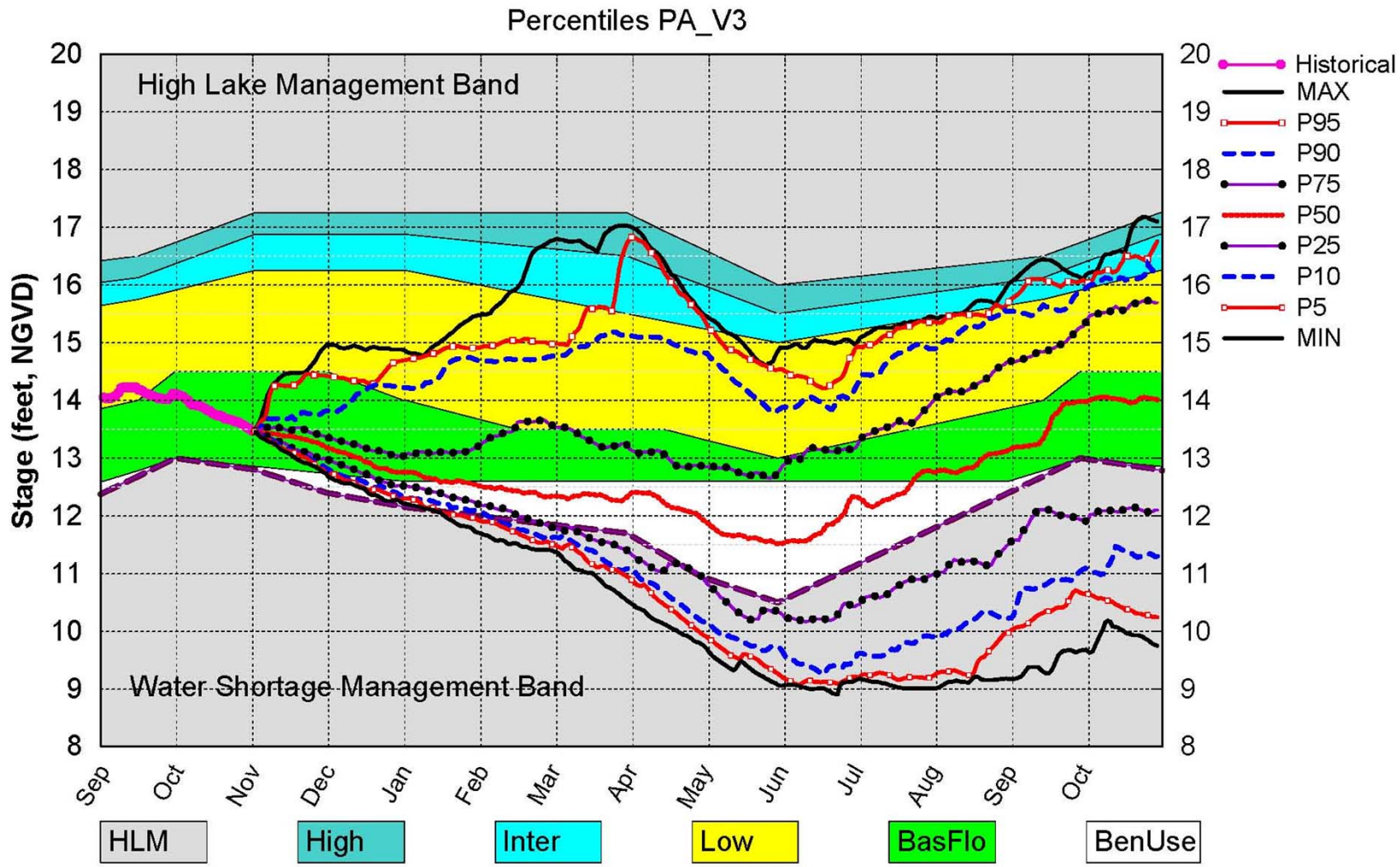


Driest wet season since 1984
Driest October on record (through 1932)
Sixth driest wet season on record.

Lake Okeechobee Stage Forecast

- Position Analysis
  - Each year starts with current hydrologic conditions
  - 41, 1-yr simulations of system response to historical rainfall conditions
  - Use SFWMM (2X2 Model)
  - Statistical summaries used to display projections

Lake Okeechobee SFWMM November 2010 Position Analysis

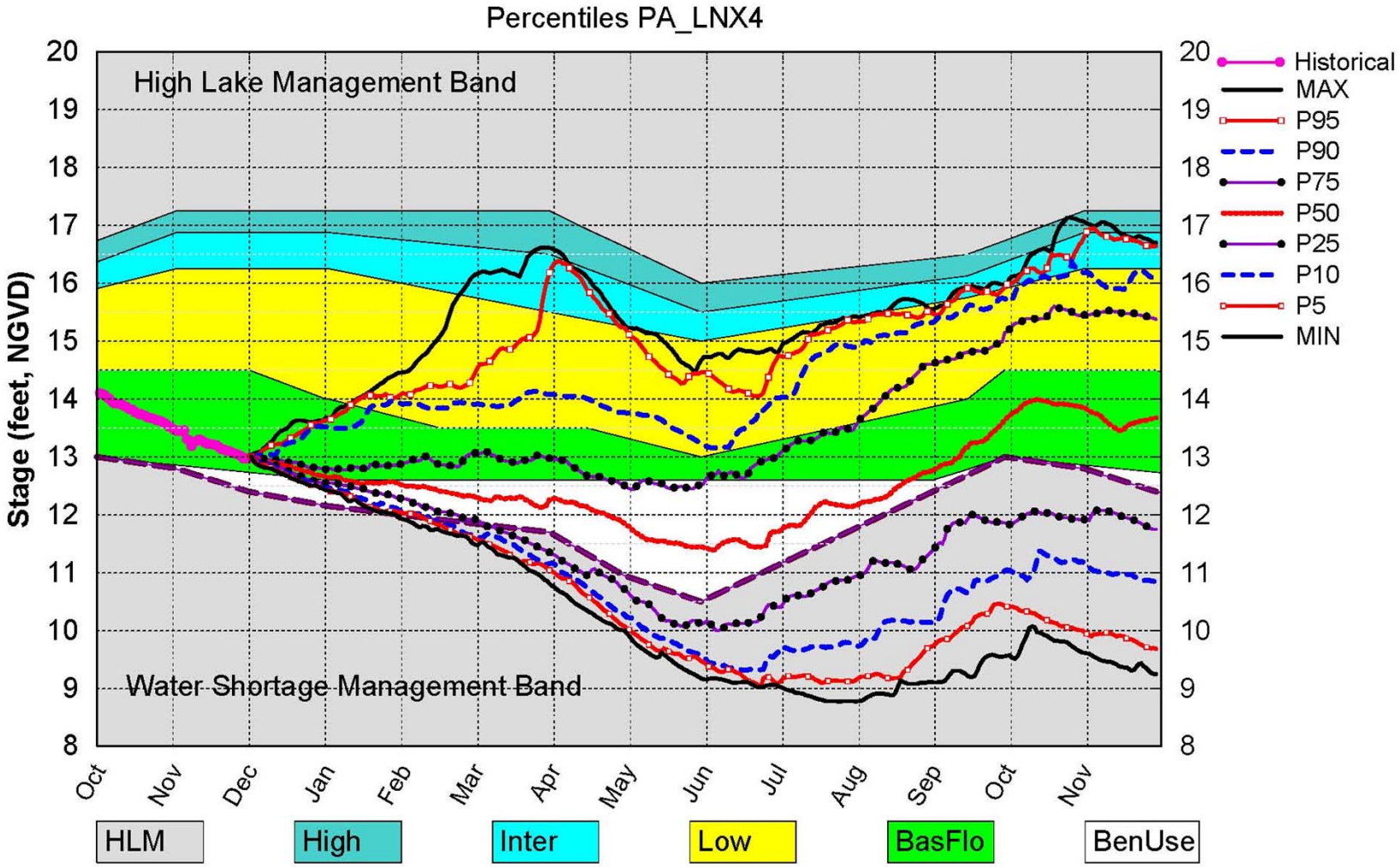


(See assumptions on the Position Analysis Results website)

Wed Nov 3 07:59:26 2010

On November 10, 2010, the District Governing Board issued a “Water Shortage Warning” for the Lake Okeechobee, Lake Istokpoga and the Indian Prairie Water Use Basins. The Water Shortage Warning calls for voluntary water conservation among all users and will provide for increased communication and outreach to water users, local governments and elected officials on the potential for water shortage conditions to intensify during the upcoming dry season.

Lake Okeechobee SFWMM December 2010 Position Analysis

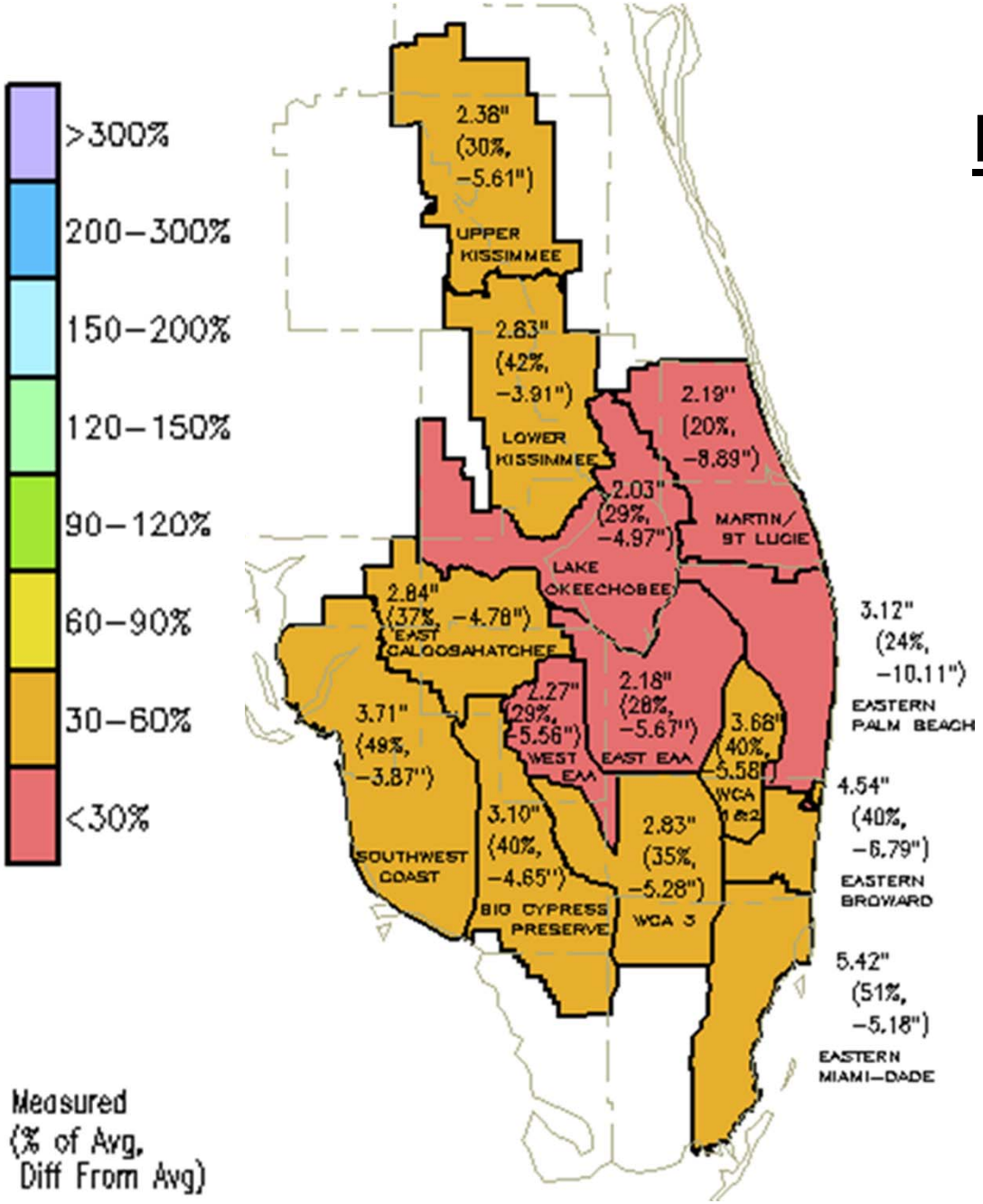


(See assumptions on the Position Analysis Results website)

Mon Dec 6 13:31:10 2010

On December 9, 2010, SFWMD delegated authority to the Executive Director to issue a Water Shortage Order implementing water restrictions in the Lake Okeechobee Service Area (LOSA) when the Lake stage recedes into the Water Shortage Management (WSM) Band of the 2008 Lake Okeechobee Regulation Schedule.

January 2011



SFWMD 2010

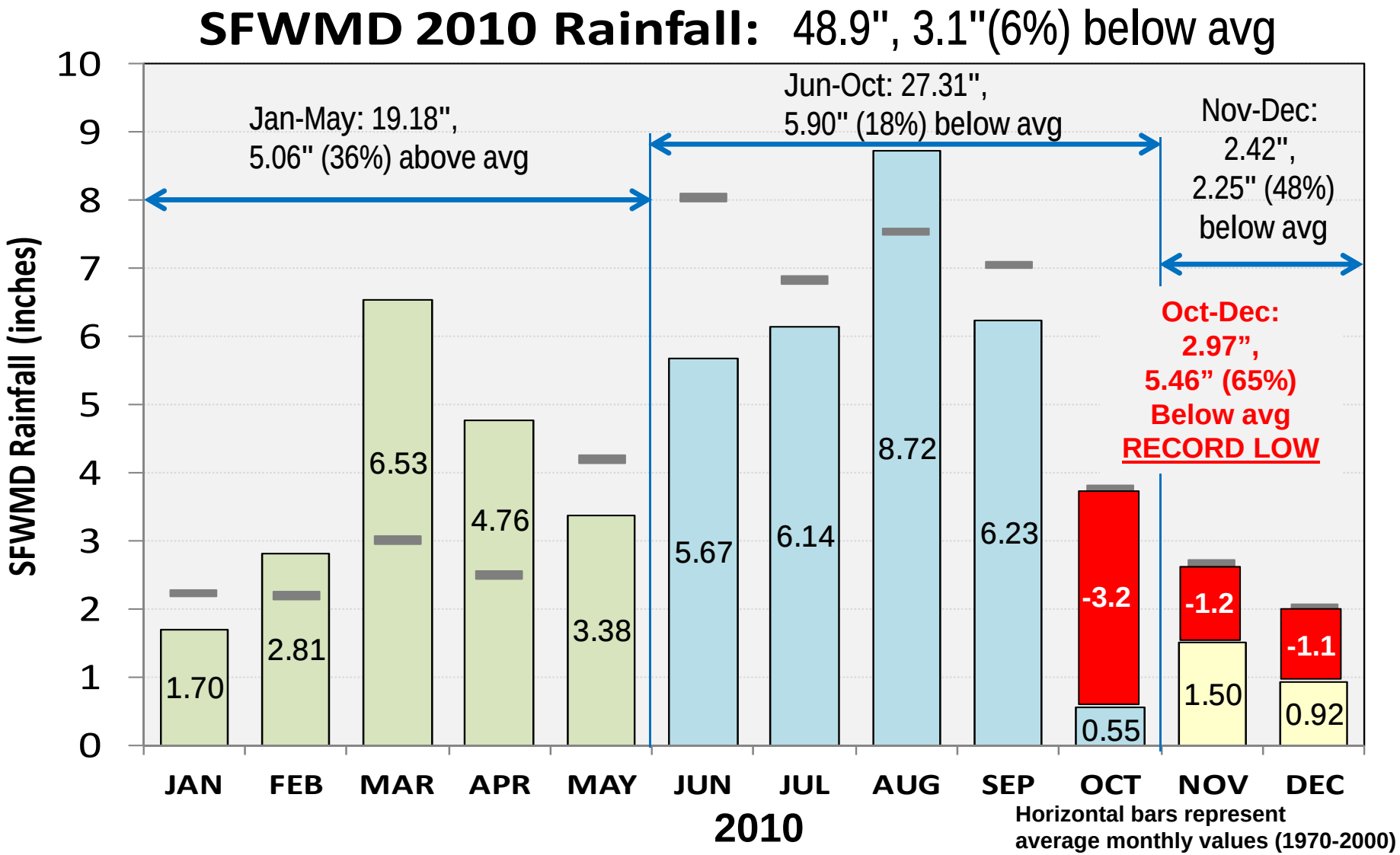
Dry Season Rainfall

Oct 02 – Jan 1

DISTRICT-WIDE: 2.97” (35% of Avg, or -5.46”)

- Lowest rainfall for Oct and Oct - Dec (3 months) since recordkeeping began in 1932
- Martin/St Lucie, Eastern Palm Beach and interior basins (Lake O., EAA) received less then 30% of average rainfall
- Upper Kissimmee Basin received about 30% of average rainfall

2010 SFWMD Rainfall Distribution



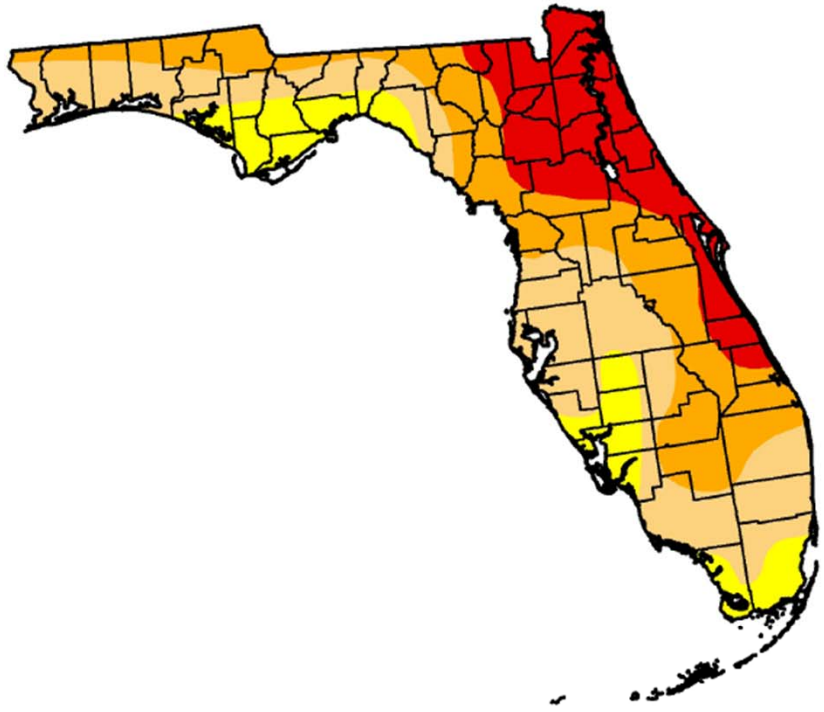
U.S. Drought Monitor

December 28, 2010
Valid 7 a.m. EST

Florida

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	0.18	99.82	86.04	50.84	20.21	0.00
Last Week (12/21/2010 map)	0.18	99.82	83.75	47.25	20.12	0.00
3 Months Ago (09/28/2010 map)	54.97	45.03	18.02	4.22	0.00	0.00
Start of Calendar Year (12/29/2009 map)	96.88	3.12	0.00	0.00	0.00	0.00
Start of Water Year (09/28/2010 map)	---	---	---	---	---	---
One Year Ago (12/22/2009 map)	91.76	8.24	0.00	0.00	0.00	0.00



Intensity:

- *D0 Abnormally Dry*
- *D1 Drought - Moderate*
- *D2 Drought - Severe*
- *D3 Drought - Extreme*
- *D4 Drought - Exceptional*

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

http://drought.unl.edu/dm

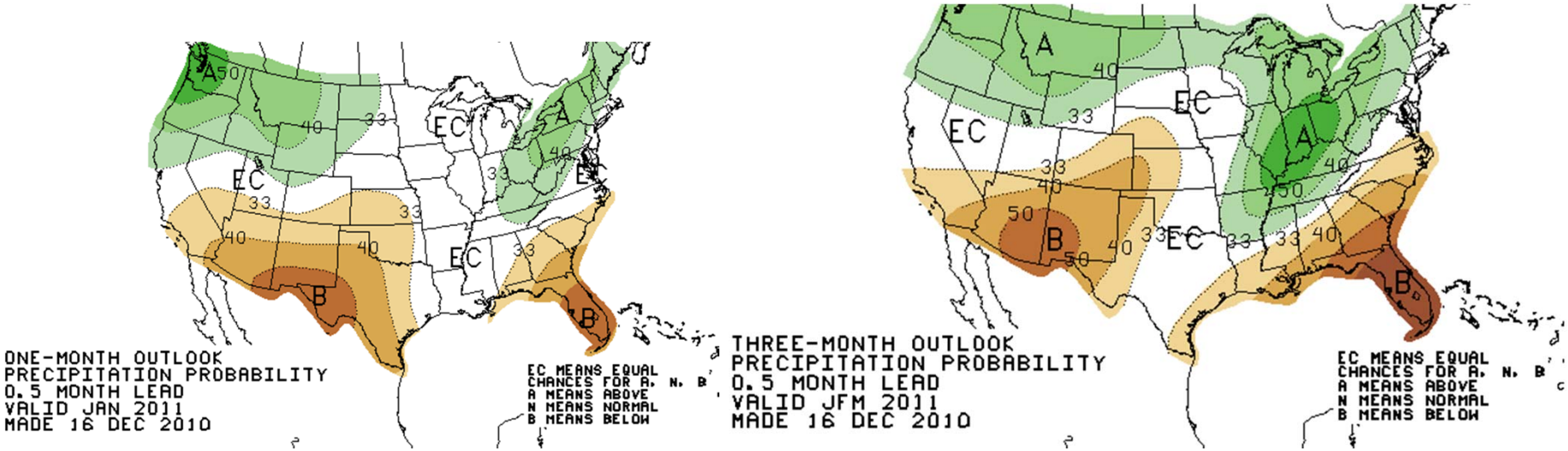
Released Thursday, December 30, 2010
National Drought Mitigation Center

U. S. Seasonal Precipitation Outlook

National Climate Prediction Center (CPC)

January

Jan-March



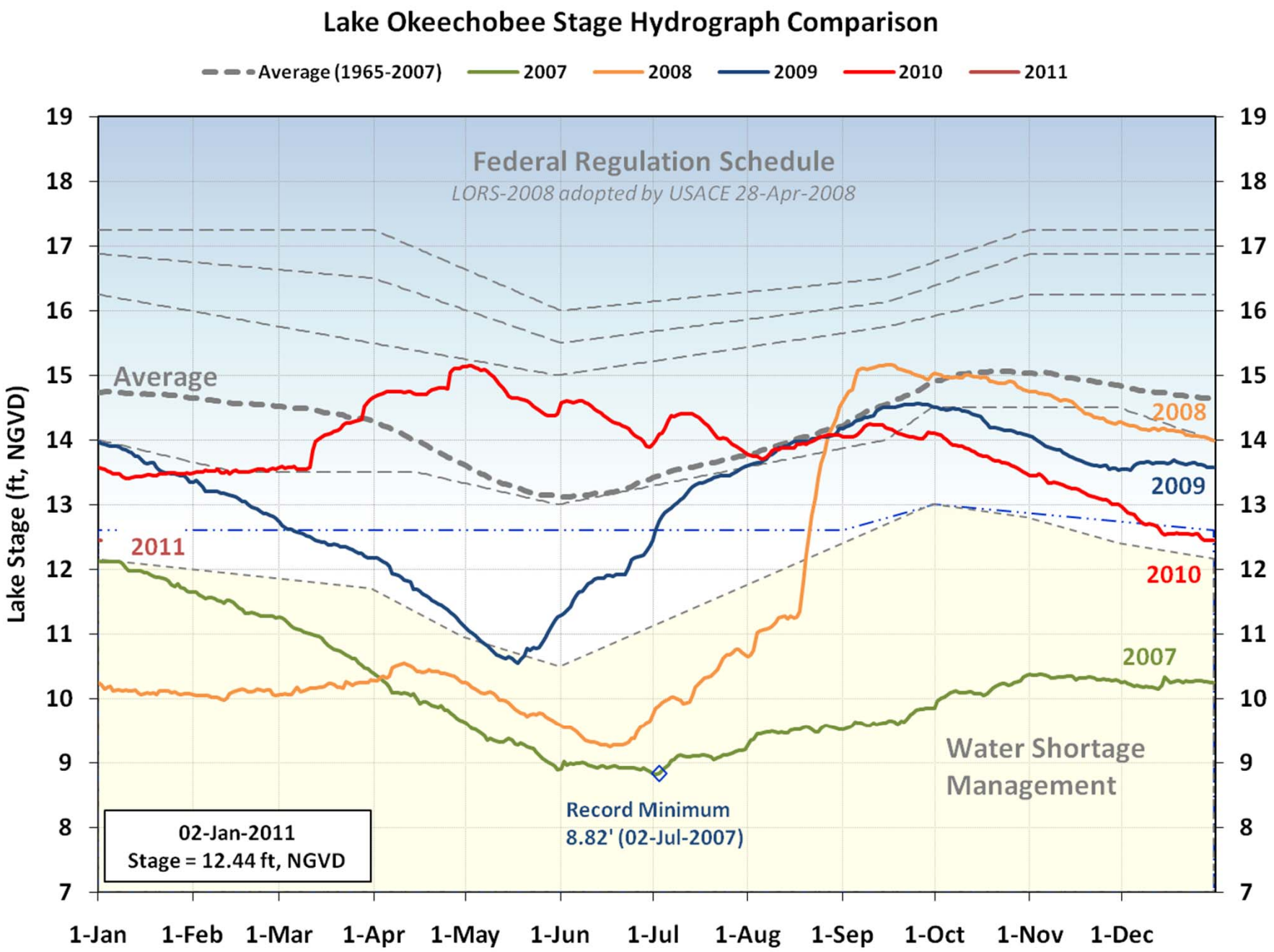
<u>La Nina conditions are expected to continue into 2010-2011 dry season</u>

The current precipitation outlook for central and southern Florida is:

- increased chance of below-normal (B) rainfall for January.
- increased chance of below-normal (B) rainfall for Jan-March
- increased chance of below-normal (B) rainfall for the entire 2010-11 dry season

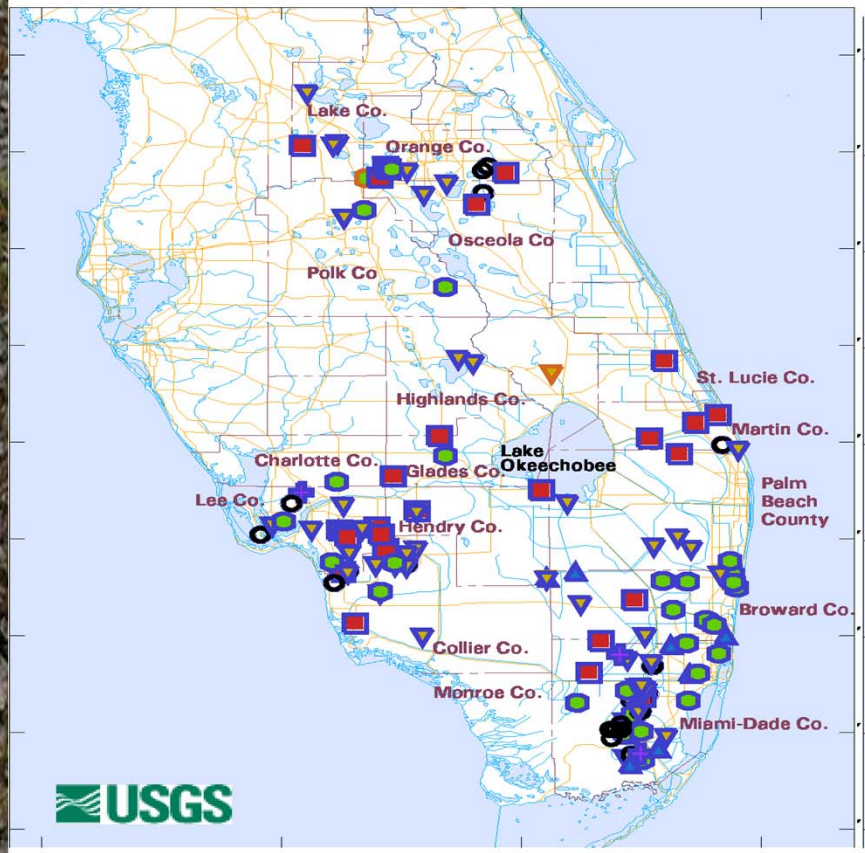
Preparation Activities Emergency Operations Center

- Water Conditions Team
- Navigation
- Agriculture
- Nurseries
- Documentation
- STAs
- Ecological
- Environmental Enhancement
- Diversion & Impoundments
- Enforcement & Compliance
- Golf Course Compliance
- Regulatory & Permitting
- Variances
- Infrastructure (Temporary Forward Pumps
- Modeling Support & Analysis
- Water Supply Utilities
- Purchasing
- Finance
- Liaison – Local Governments
- Legal
- Citizen's Information Line
- Media


Lake Okeechobee Stage Hydrograph Comparison
Average (1965-2007)
2007
2008
2009
2010
2011
Federal Regulation Schedule
LORS-2008 adopted by USACE 28-Apr-2008
Average
2008
2009
2011
2010
2007
Water Shortage Management
Record Minimum
8.82' (02-Jul-2007)
02-Jan-2011
Stage = 12.44 ft, NGVD
Lake Stage (ft, NGVD)
19
18
17
16
15
14
13
12
11
10
9
8
7
1-Jan
1-Feb
1-Mar
1-Apr
1-May
1-Jun
1-Jul
1-Aug
1-Sep
1-Oct
1-Nov
1-Dec

Groundwater Levels

Nov. 30, 2010



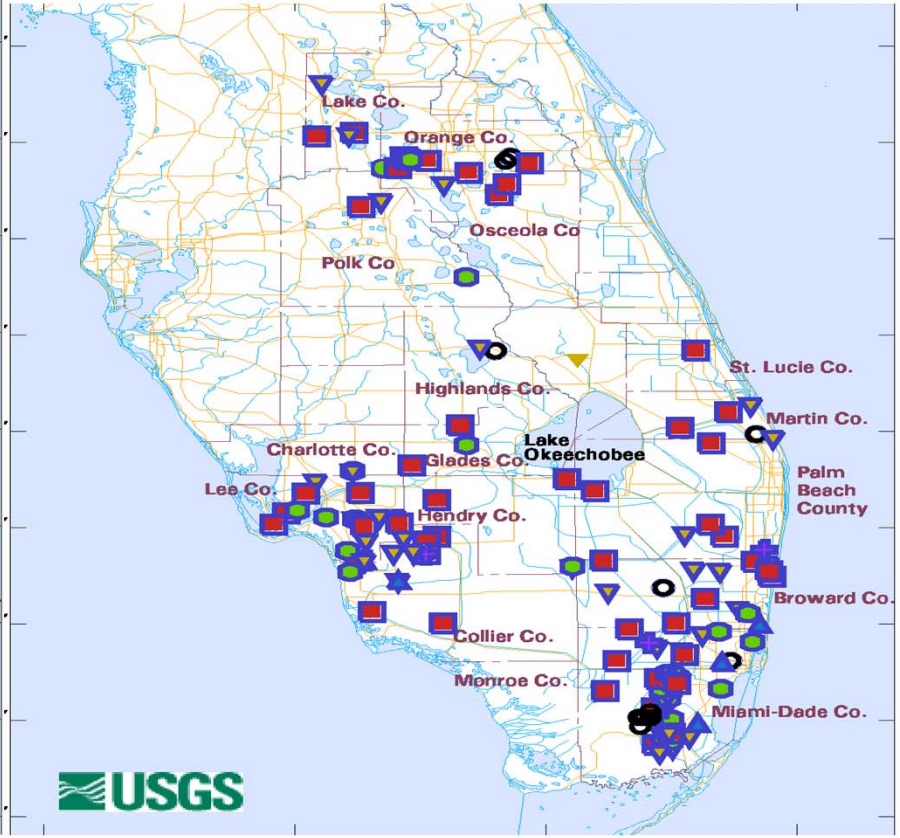
0 15 30 45 60 75 90 MILES
0 15 30 45 60 75 90 KILOMETERS

Rivers and canals
Roads and highways
County boundaries
Telemetry site

Water level compared to historical data, without trend analysis:
- Insufficient information available to compute water-level statistics
- In lowest 10 percent of past water elevations
- Within lowest 10 to 30 percent of past water elevations
- Within 20 percent of the median of past water elevations
- Within highest 10 to 30 percent of past water elevations
- In highest 10 percent of past water elevations

Water levels at selected sites in South Florida,
Based on PROVISIONAL DATA, as of November 30, 2010.

Jan. 5, 2011



0 15 30 45 60 75 90 MILES
0 15 30 45 60 75 90 KILOMETERS

Rivers and canals
Roads and highways
County boundaries
Telemetry site

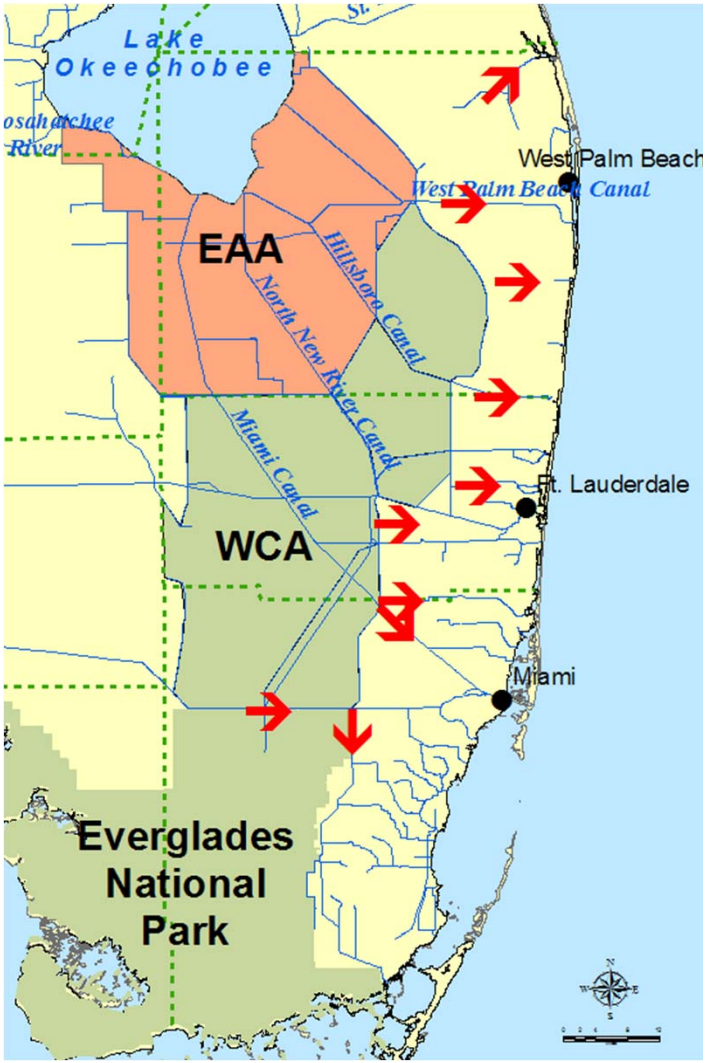
Water level compared to historical data, after long-term trends are rem
- Insufficient information available to compute water-level statistics
- In lowest 10 percent of past water elevations
- Within lowest 10 to 30 percent of past water elevations
- Within 20 percent of the median of past water elevations
- Within highest 10 to 30 percent of past water elevations
- In highest 10 percent of past water elevations

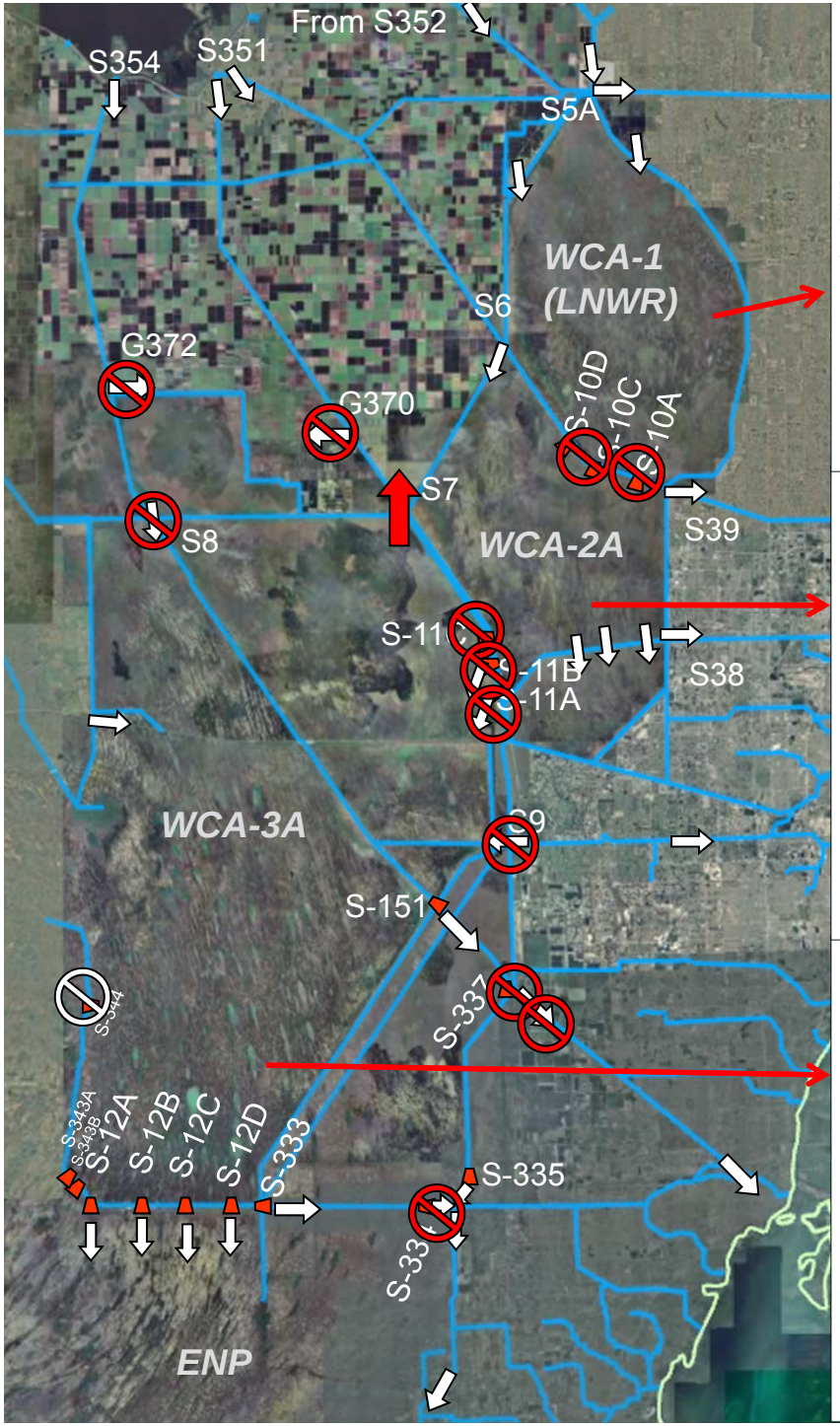
Water levels at selected sites in South Florida,
Based on PROVISIONAL DATA, as of January 5, 2011.

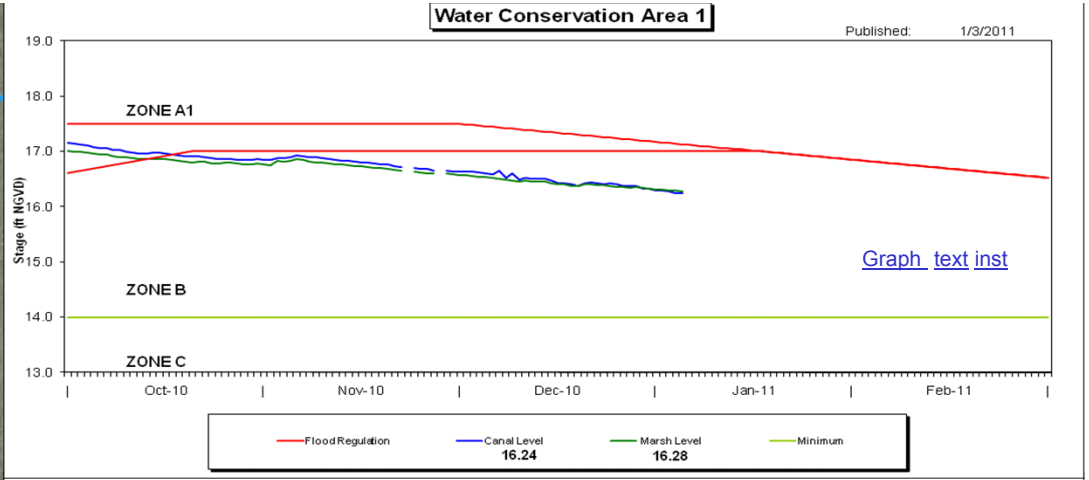
Reliance on Regional C&SF System

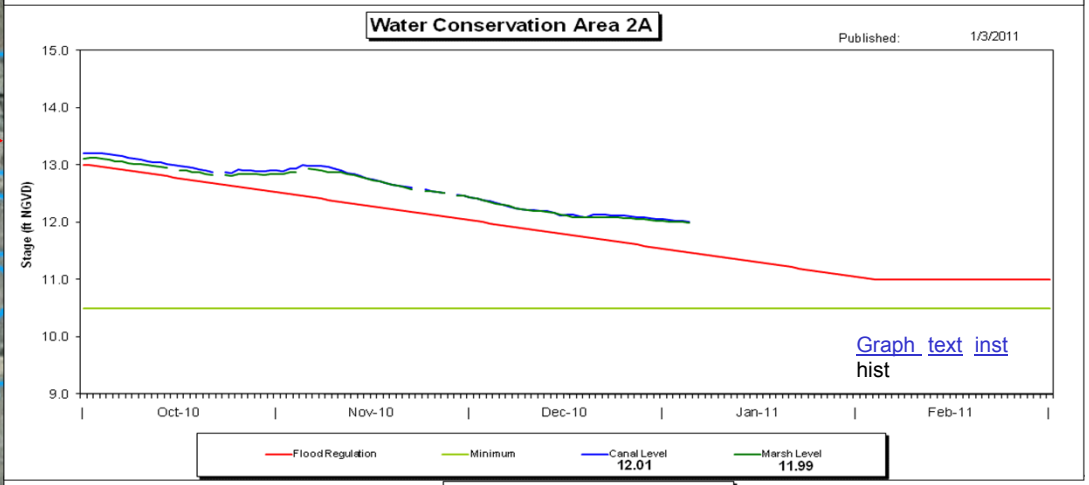
Water deliveries to maintain groundwater levels during the dry season & recharge wellfields

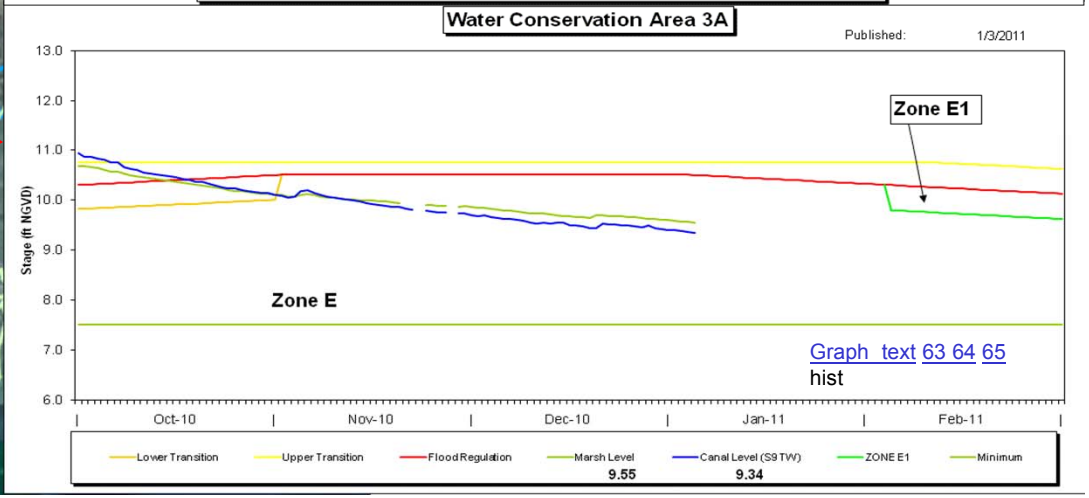
- Lake Okeechobee
- Water Conservation Areas
- SFWMD Canals
- local / secondary canals
- Regional recharge +/- 500 mgd



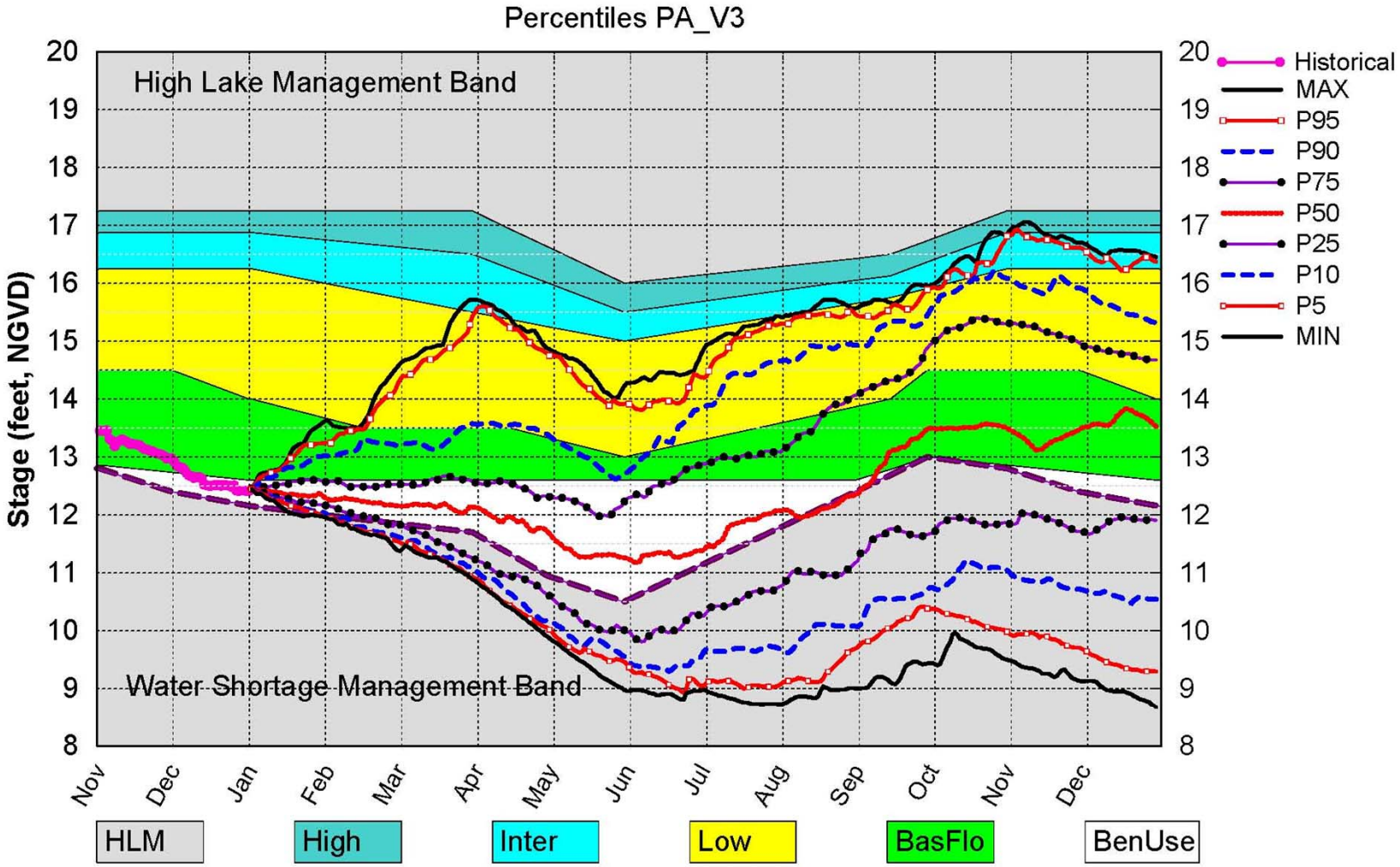

From S352
S354
S351
S5A
WCA-1
(LNWR)
S6
G372
G370
S-10D
S-10C
S-10A
S7
S8
S39
WCA-2A
S-11
S-11B
S-11A
S38
WCA-3A
S9
S-151
S-344
S-337
S-343A
S-343B
S-12A
S-12B
S-12C
S-12D
S-333
S-335
S-33
ENP


Water Conservation Area 1
Published: 1/3/2011
ZONE A1
ZONE B
ZONE C
Stage (ft NGVD)
19.0
18.0
17.0
16.0
15.0
14.0
13.0
Oct-10
Nov-10
Dec-10
Jan-11
Feb-11
Graph text inst
Flood Regulation
Canal Level
16.24
Marsh Level
16.28
Minimum


Water Conservation Area 2A
Published: 1/3/2011
Stage (ft NGVD)
15.0
14.0
13.0
12.0
11.0
10.0
9.0
Oct-10
Nov-10
Dec-10
Jan-11
Feb-11
Graph text inst
hist
Flood Regulation
Minimum
Canal Level
12.01
Marsh Level
11.99


Water Conservation Area 3A
Published: 1/3/2011
Zone E1
Zone E
Stage (ft NGVD)
13.0
12.0
11.0
10.0
9.0
8.0
7.0
6.0
Oct-10
Nov-10
Dec-10
Jan-11
Feb-11
Graph text 63 64 65
hist
Lower Transition
Upper Transition
Flood Regulation
Marsh Level
9.55
Canal Level (S9TW)
9.34
ZONE E1
Minimum

Lake Okeechobee SFWMM January 2011 Position Analysis

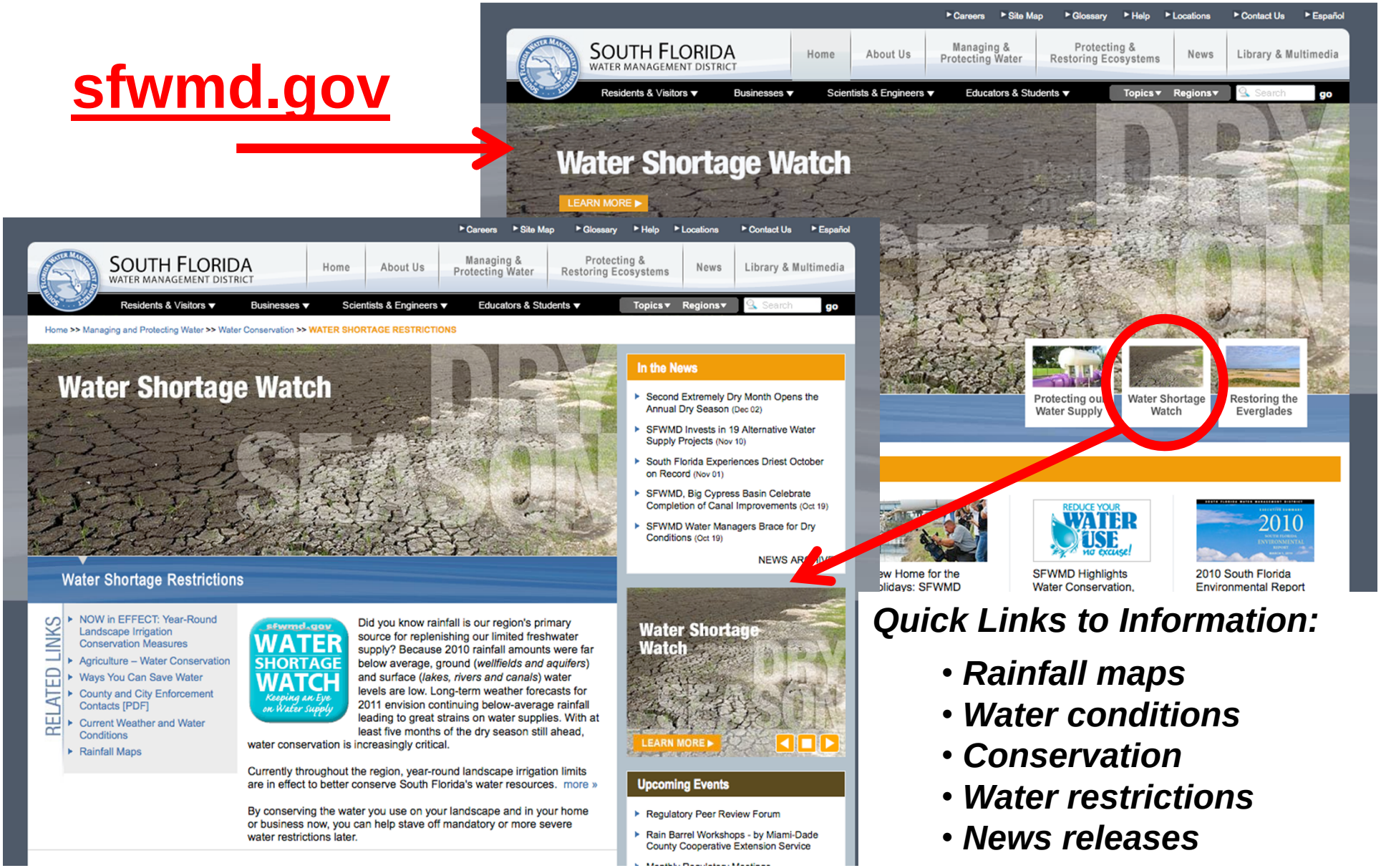


(See assumptions on the Position Analysis Results website)

Wed Jan 5 15:39:40 2011

Water Shortage Communication

sfwmd.gov

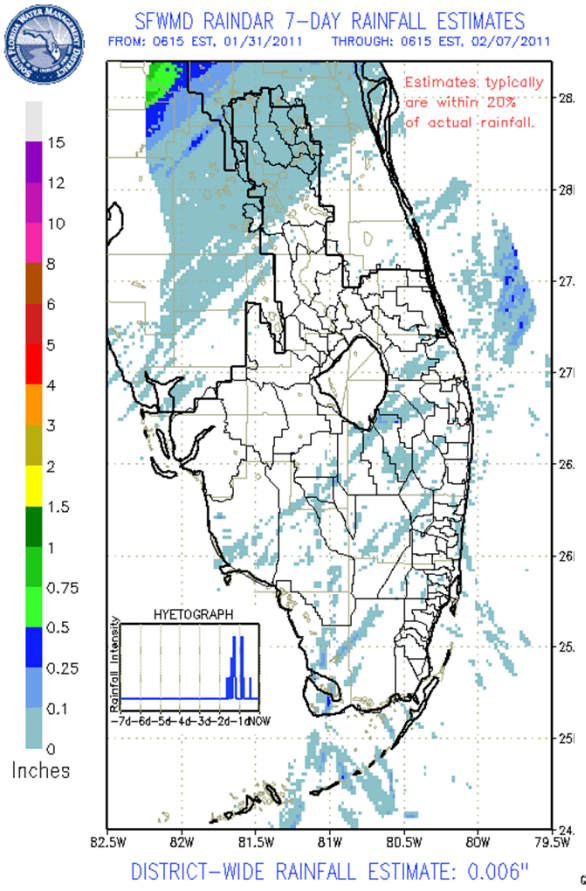


Quick Links to Information:

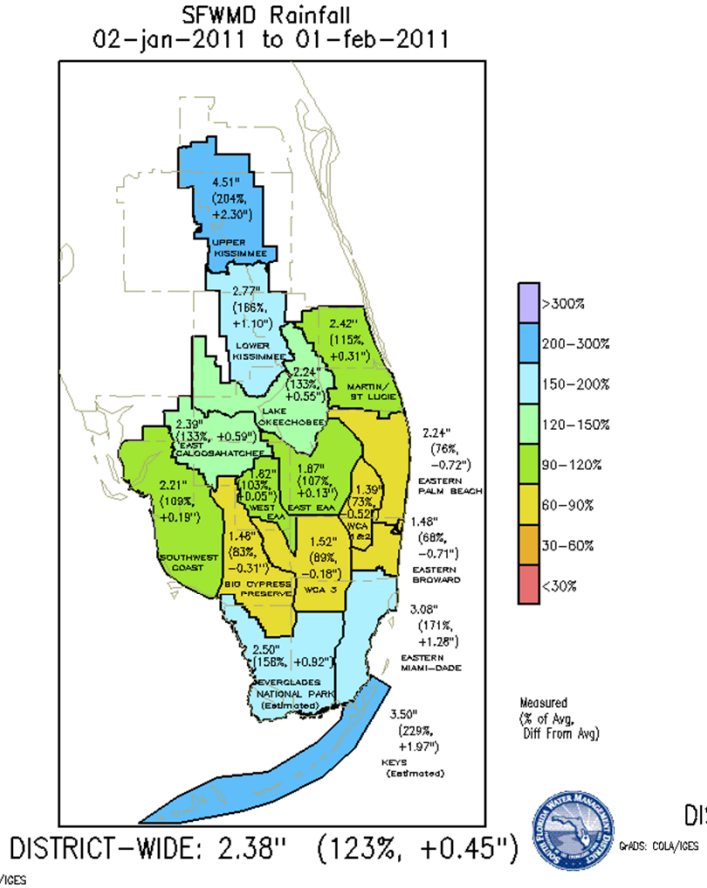
- ***Rainfall maps***
- ***Water conditions***
- ***Conservation***
- ***Water restrictions***
- ***News releases***

February 2011

Last 7 days Rainfall

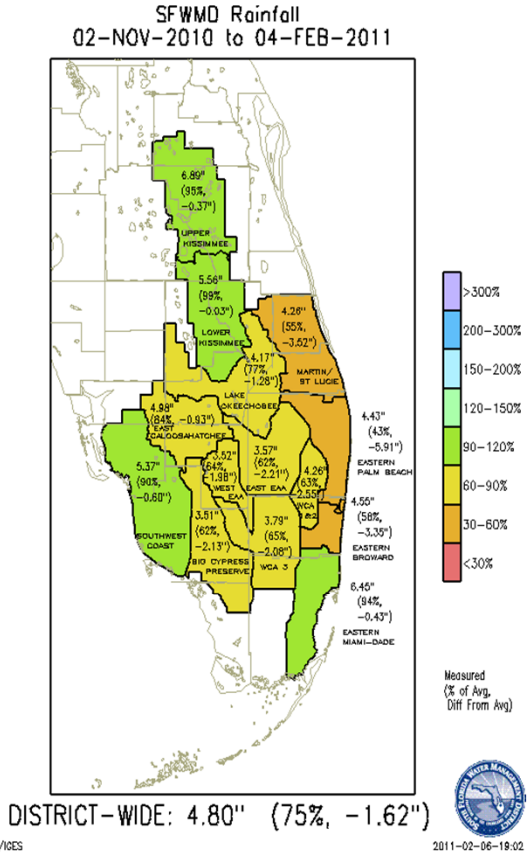


January



Dry season

Up to Feb 04



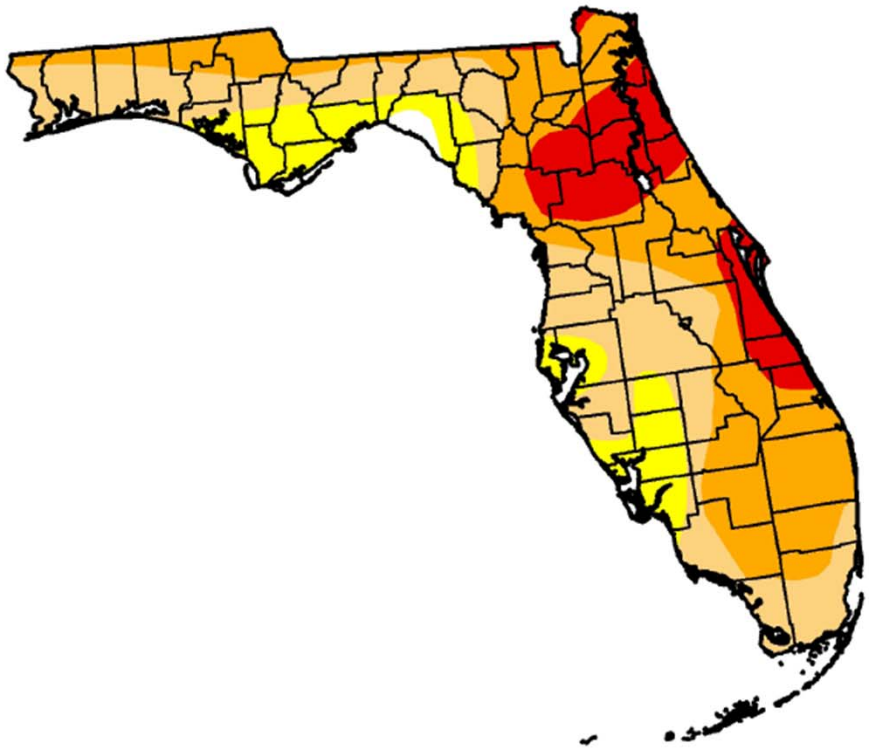
U.S. Drought Monitor

Florida

February 1, 2011
Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	0.87	99.13	84.98	50.76	13.71	0.00
Last Week (01/25/2011 map)	0.17	99.83	87.73	54.25	20.96	0.00
3 Months Ago (11/02/2010 map)	11.60	88.40	50.87	29.62	4.30	0.00
Start of Calendar Year (12/28/2010 map)	0.18	99.82	86.04	50.84	20.21	0.00
Start of Water Year (09/28/2010 map)	54.97	45.03	18.02	4.22	0.00	0.00
One Year Ago (01/26/2010 map)	100.00	0.00	0.00	0.00	0.00	0.00



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- *D4 Drought - Exceptional*

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http://drought.unl.edu/dm

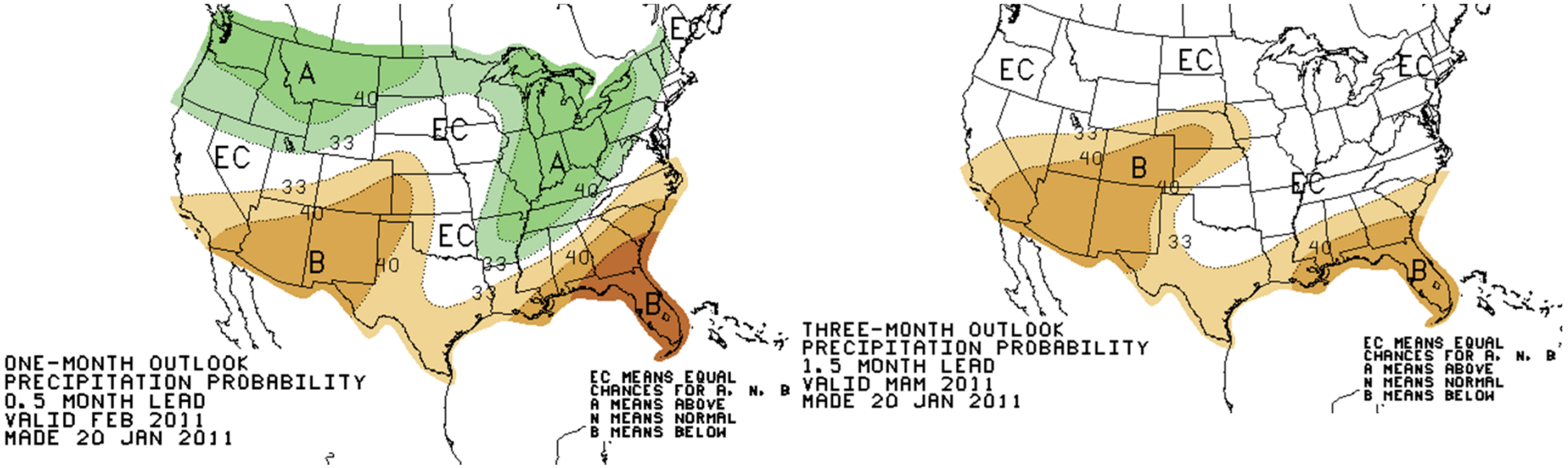
Released Thursday, February 3, 2011

R. Heim/L. Love-Brotak, NCDC/NOAA

U. S. Seasonal Precipitation Outlook

National Climate Prediction Center (CPC)

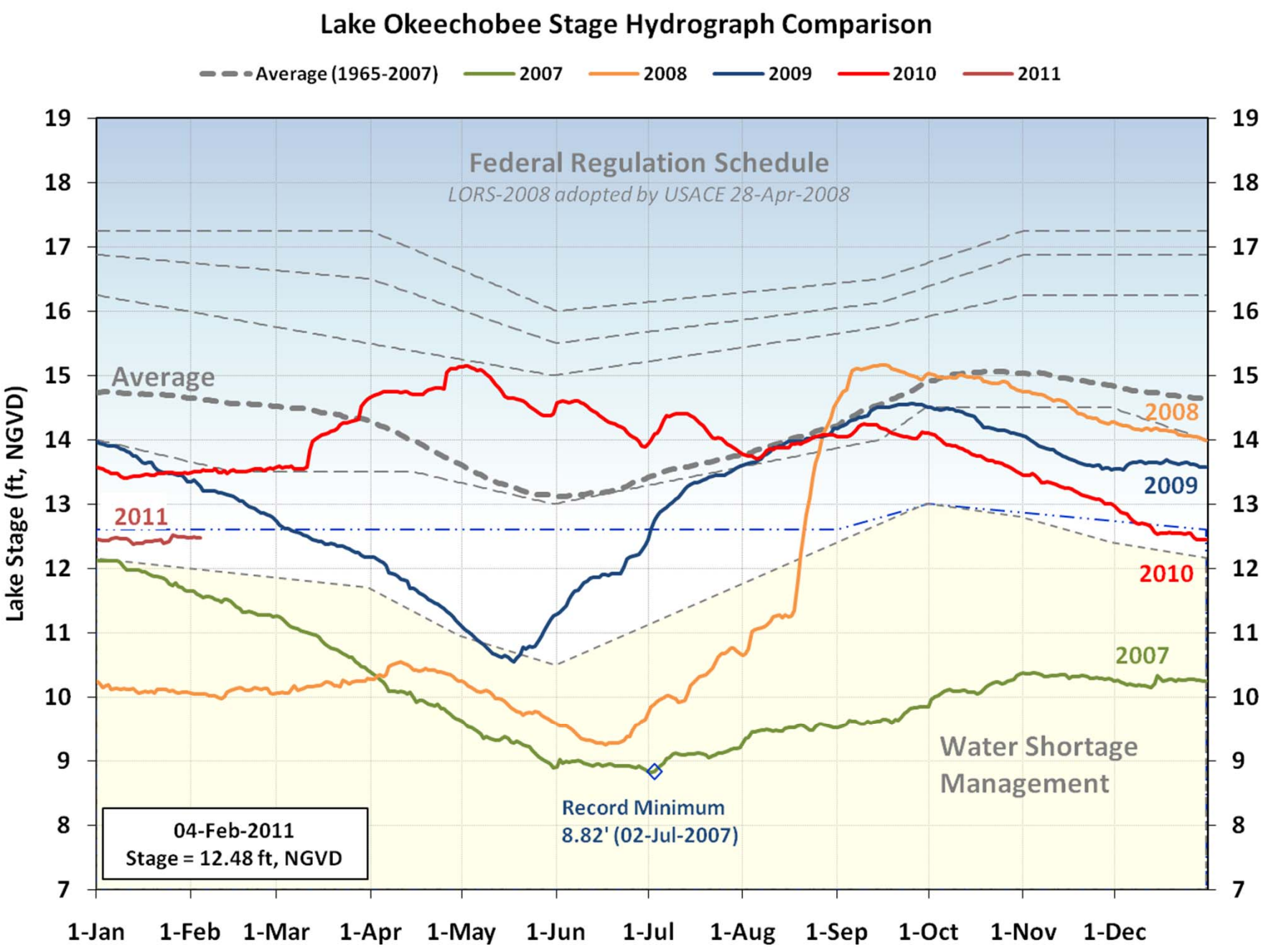
Feb 2011 **March-Apr-May 2011**



<u>La Niña conditions are expected to continue into the 2010-2011 dry season</u>

The current precipitation outlook for central and southern Florida is:

- increased chance of below-normal (B) rainfall for February.
- increased chance of below-normal (B) rainfall for March-May 2011
- increased chance of below-normal (B) rainfall for the entire 2010-11 dry season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Average
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Record Minimum
8.82' (02-Jul-2007)
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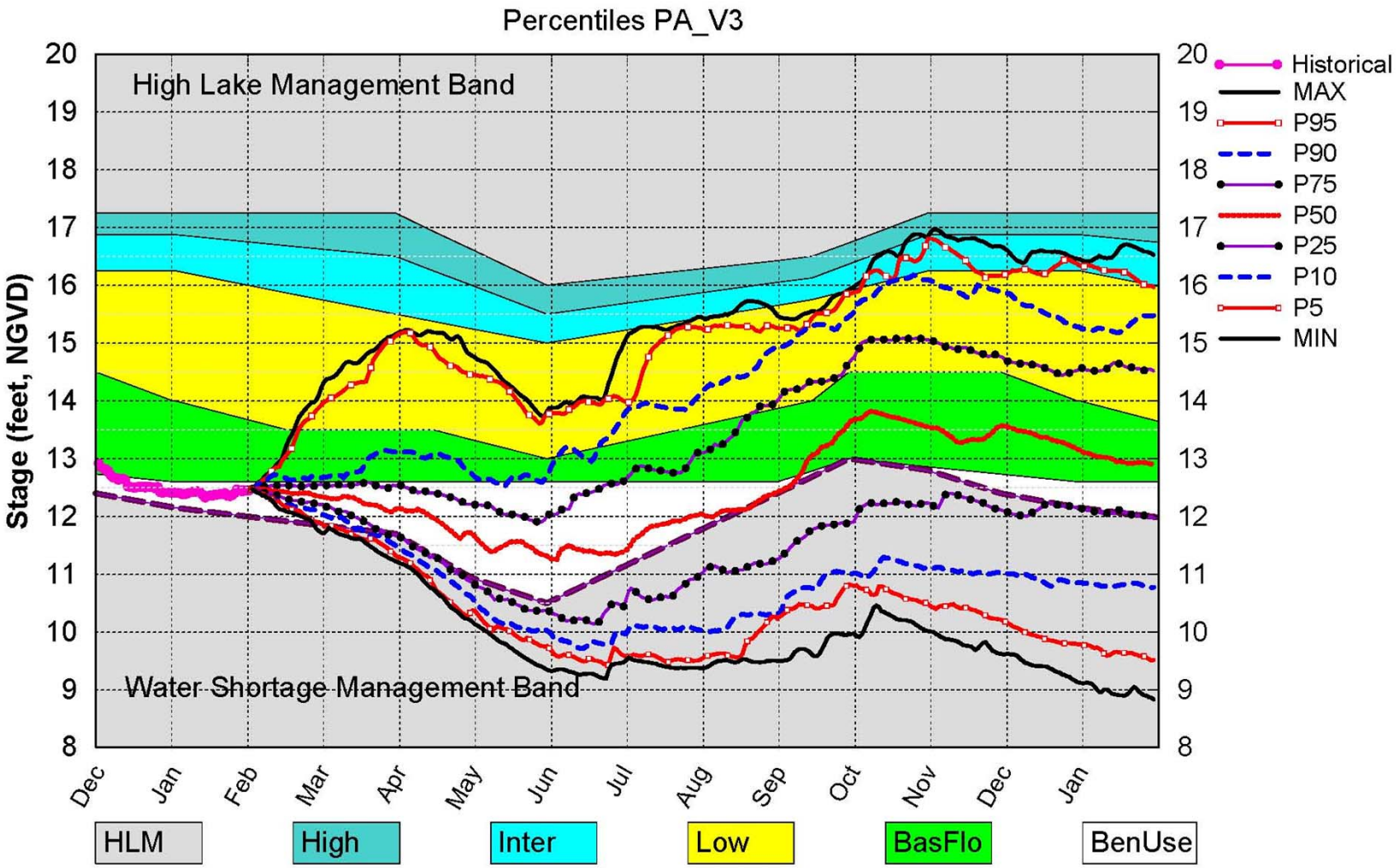
Lake Stage (ft, NGVD)
19
18
17
16
15
14
13
12
11
10
9
8
7
1-Jan
1-Feb
1-Mar
1-Apr
1-May
1-Jun
1-Jul
1-Aug
1-Sep
1-Oct
1-Nov
1-Dec

Lake Okeechobee SFWMM February 2011 Position Analysis

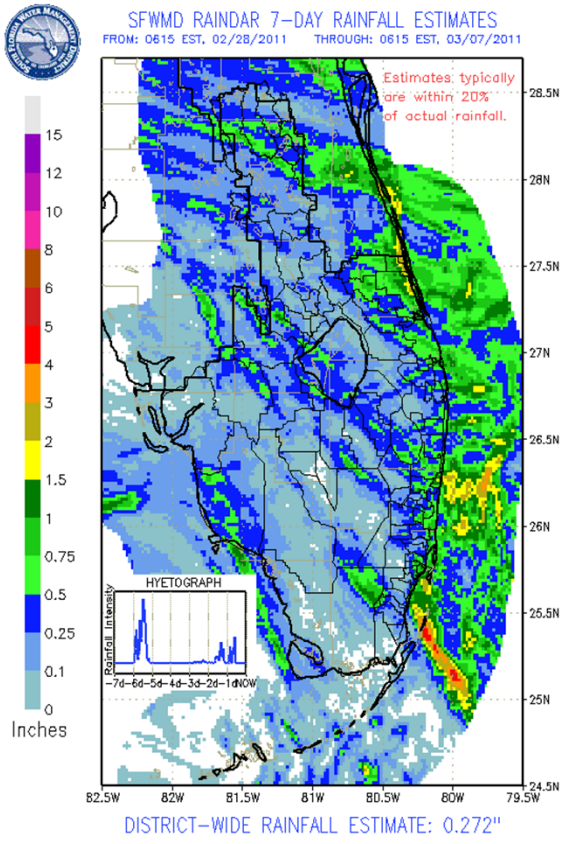


(See assumptions on the Position Analysis Results website)

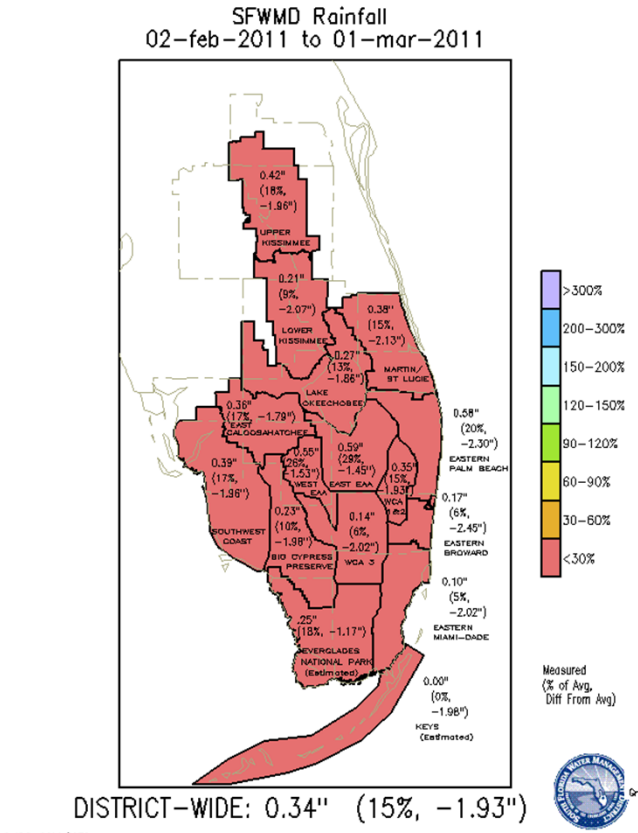
Fri Feb 4 12:50:46 2011

March 2011

Last 7 days Rainfall



February



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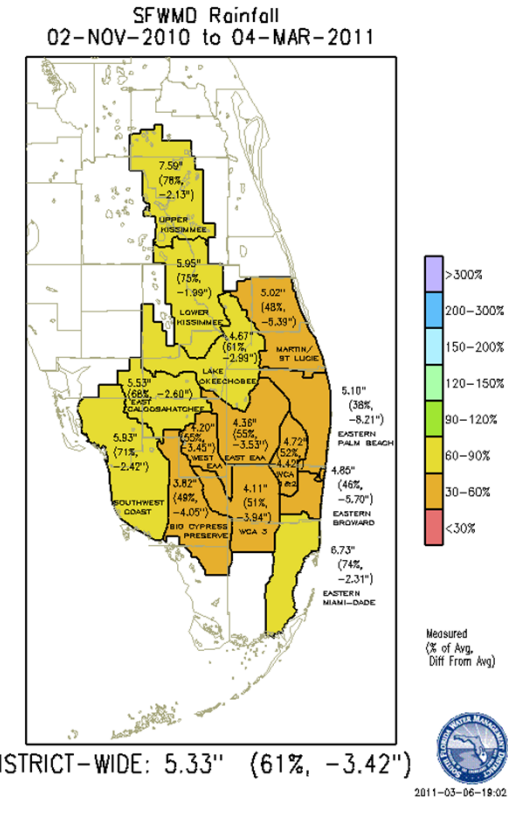

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Florida

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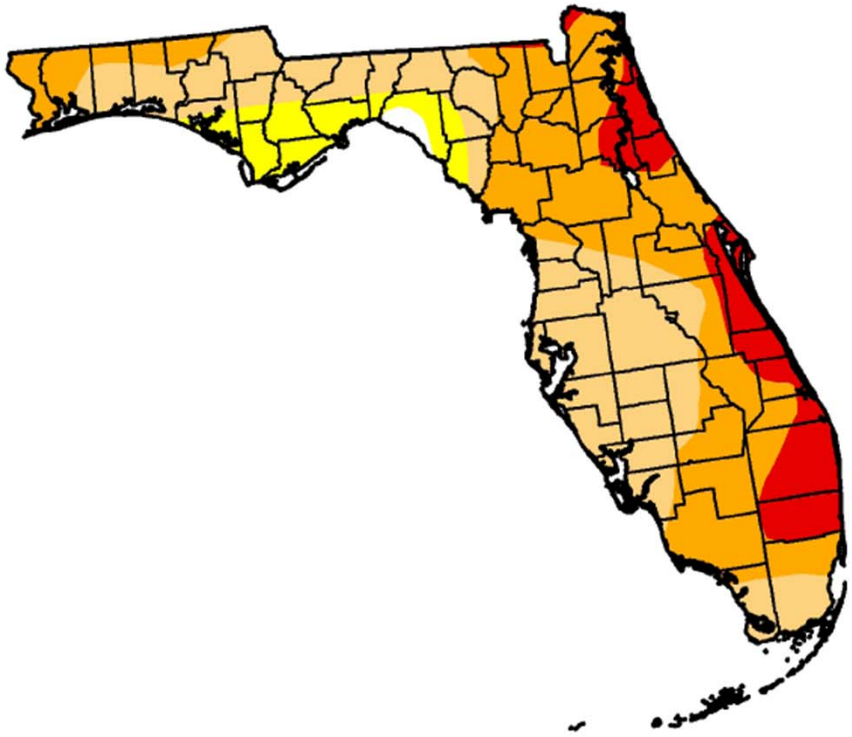
Last Week (02/22/2011 map)	0.87	99.13	84.98	48.42	10.64	0.00
3 Months Ago (11/30/2010 map)	4.08	95.92	69.13	30.22	7.91	0.00
Start of Calendar Year (12/28/2010 map)	0.18	99.82	86.04	50.84	20.21	0.00
Start of Water Year (09/28/2010 map)	54.97	45.03	18.02	4.22	0.00	0.00
One Year Ago (02/23/2010 map)	100.00	0.00	0.00	0.00	0.00	0.00



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Released Thursday, March 3, 2011
L. Edwards, Western Regional Climate Center

U. S. Seasonal Precipitation Outlook

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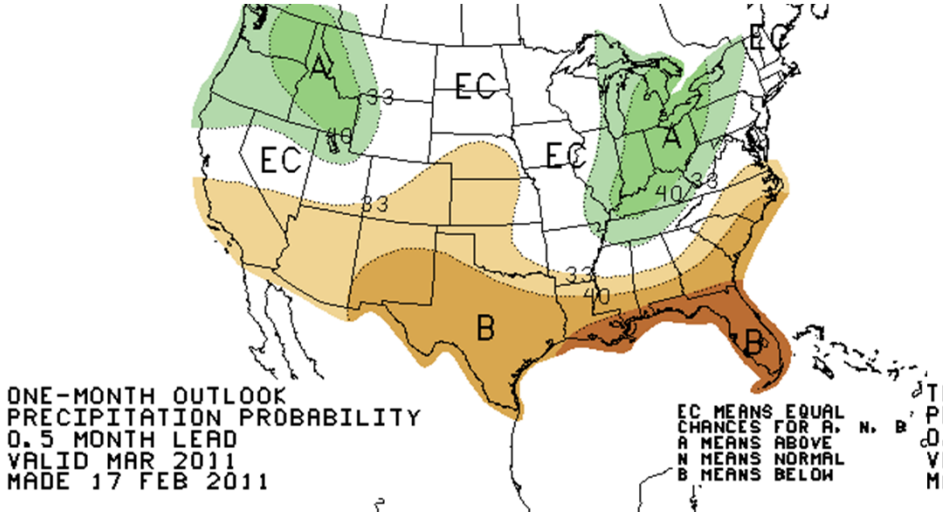
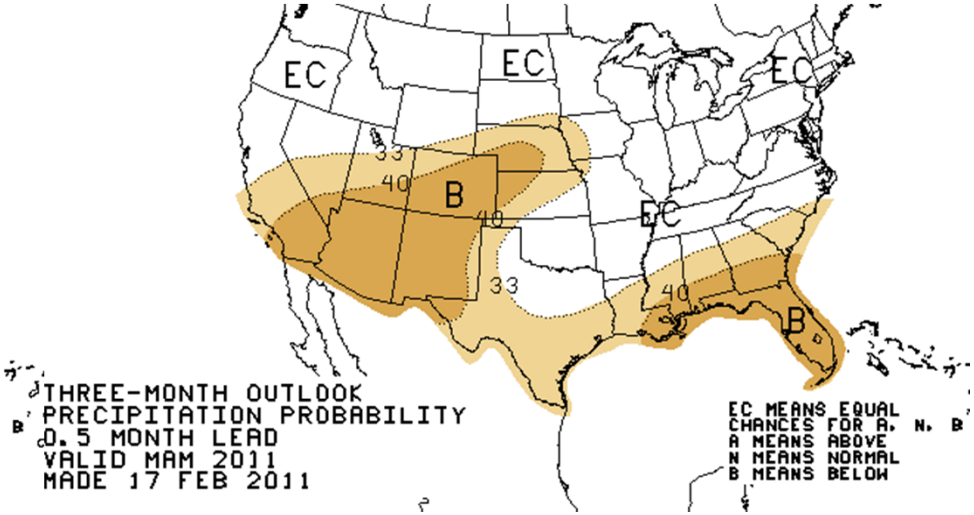
March 2011



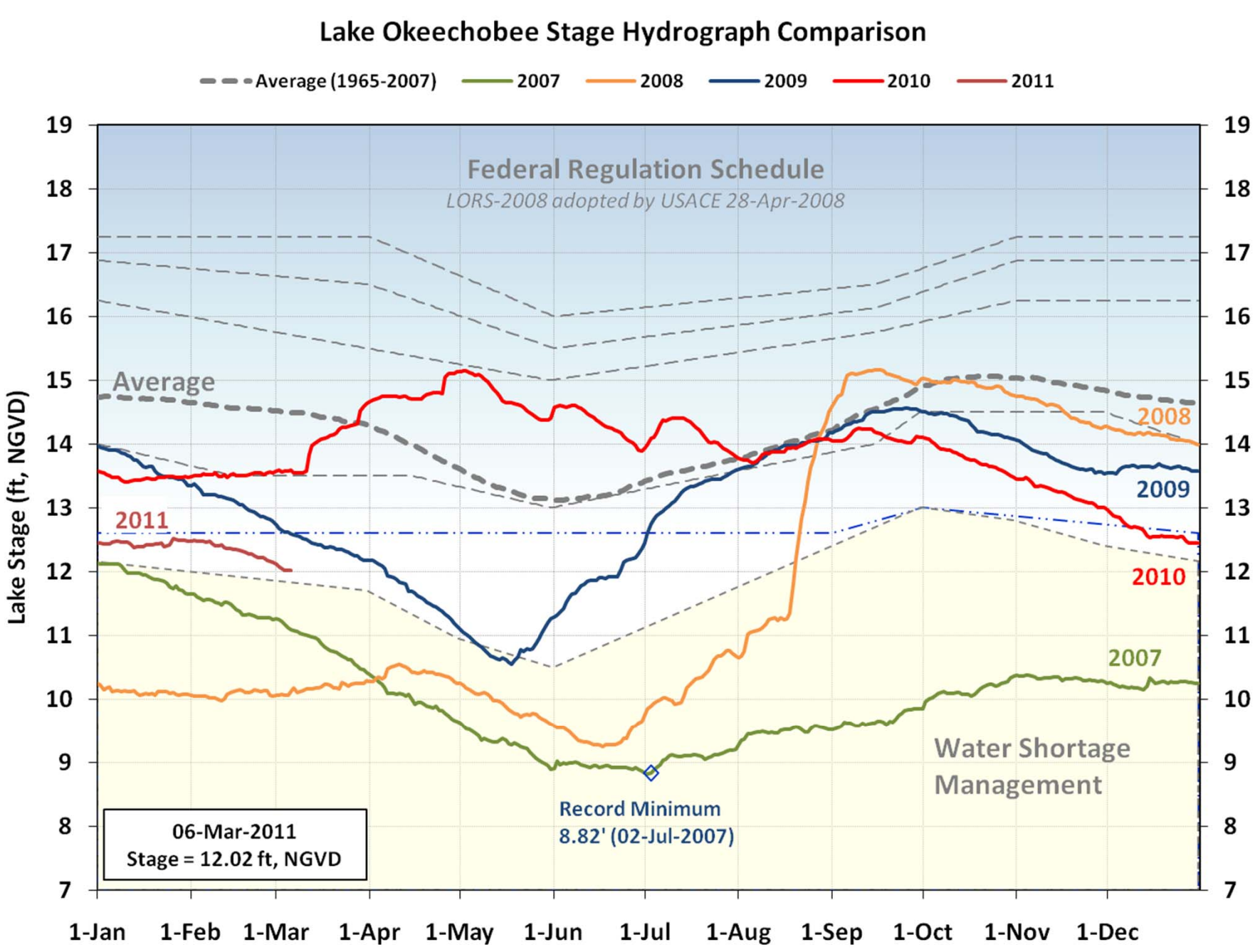
March-April-May 2011



<u>La Niña conditions are expected to continue into the 2010-2011 dry season</u>

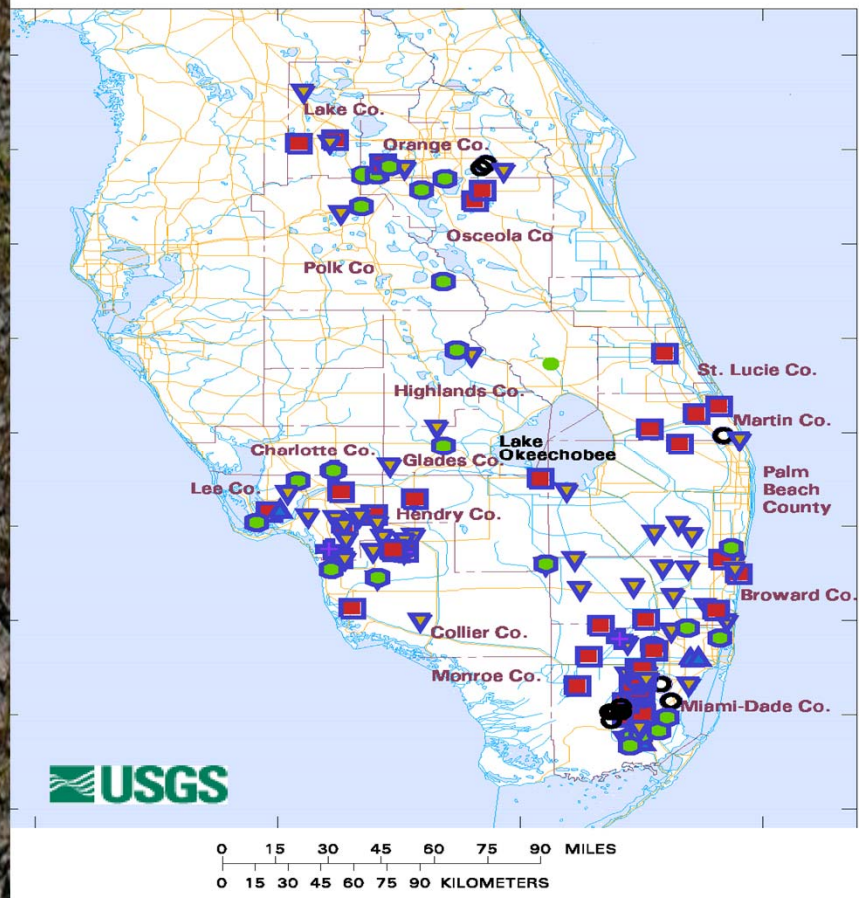
The current precipitation outlook for central and southern Florida is:

- increased chance of below-normal (B) rainfall for March.
- increased chance of below-normal (B) rainfall for March-May 2011
- increased chance of below-normal (B) rainfall for the entire 2010-11 dry season


Lake Okeechobee Stage Hydrograph Comparison
Average (1965-2007)
2007
2008
2009
2010
2011
Federal Regulation Schedule
LORS-2008 adopted by USACE 28-Apr-2008
Average
2008
2009
2011
2010
2007
Water Shortage Management
Record Minimum
8.82' (02-Jul-2007)
06-Mar-2011
Stage = 12.02 ft, NGVD
Lake Stage (ft, NGVD)
19
18
17
16
15
14
13
12
11
10
9
8
7
1-Jan
1-Feb
1-Mar
1-Apr
1-May
1-Jun
1-Jul
1-Aug
1-Sep
1-Oct
1-Nov
1-Dec

Groundwater Levels

Mar. 7, 2011

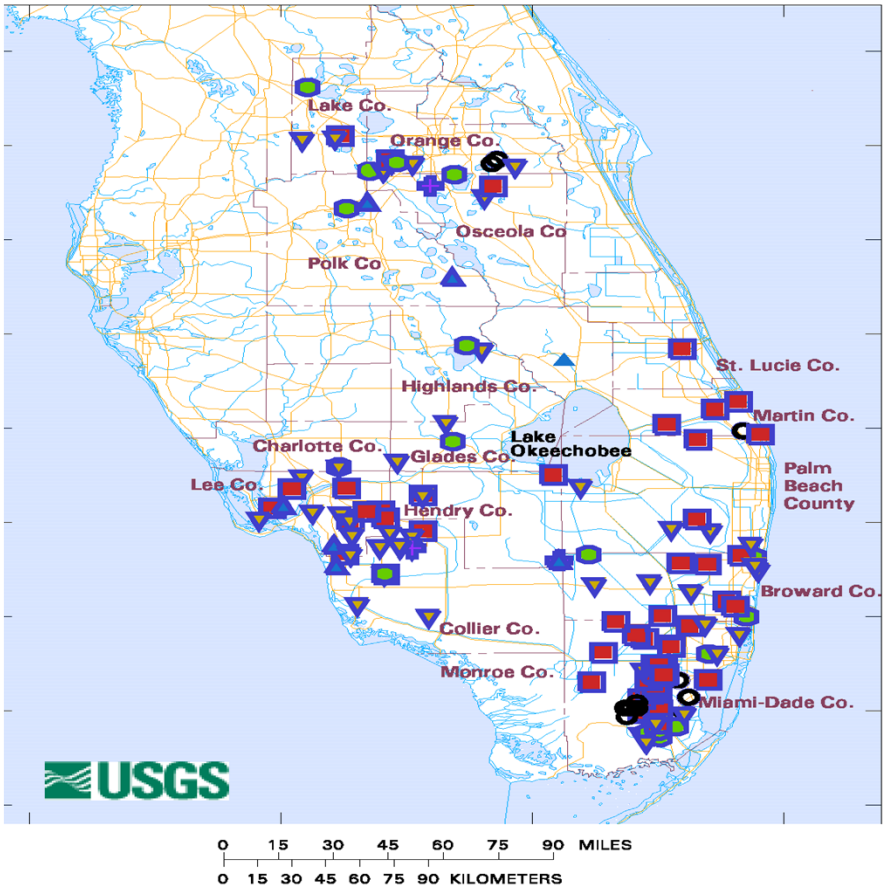


Rivers and canals
Roads and highways
County boundaries
Telemetry site

Water level compared to historical data, after long-term trends are rem
- Insufficient information available to compute water-level statistics
- In lowest 10 percent of past water elevations
- Within lowest 10 to 30 percent of past water elevations
- Within 20 percent of the median of past water elevations
- Within highest 10 to 30 percent of past water elevations
- In highest 10 percent of past water elevations

Water levels at selected sites in South Florida,
Based on PROVISIONAL DATA, as of March 7, 2011.

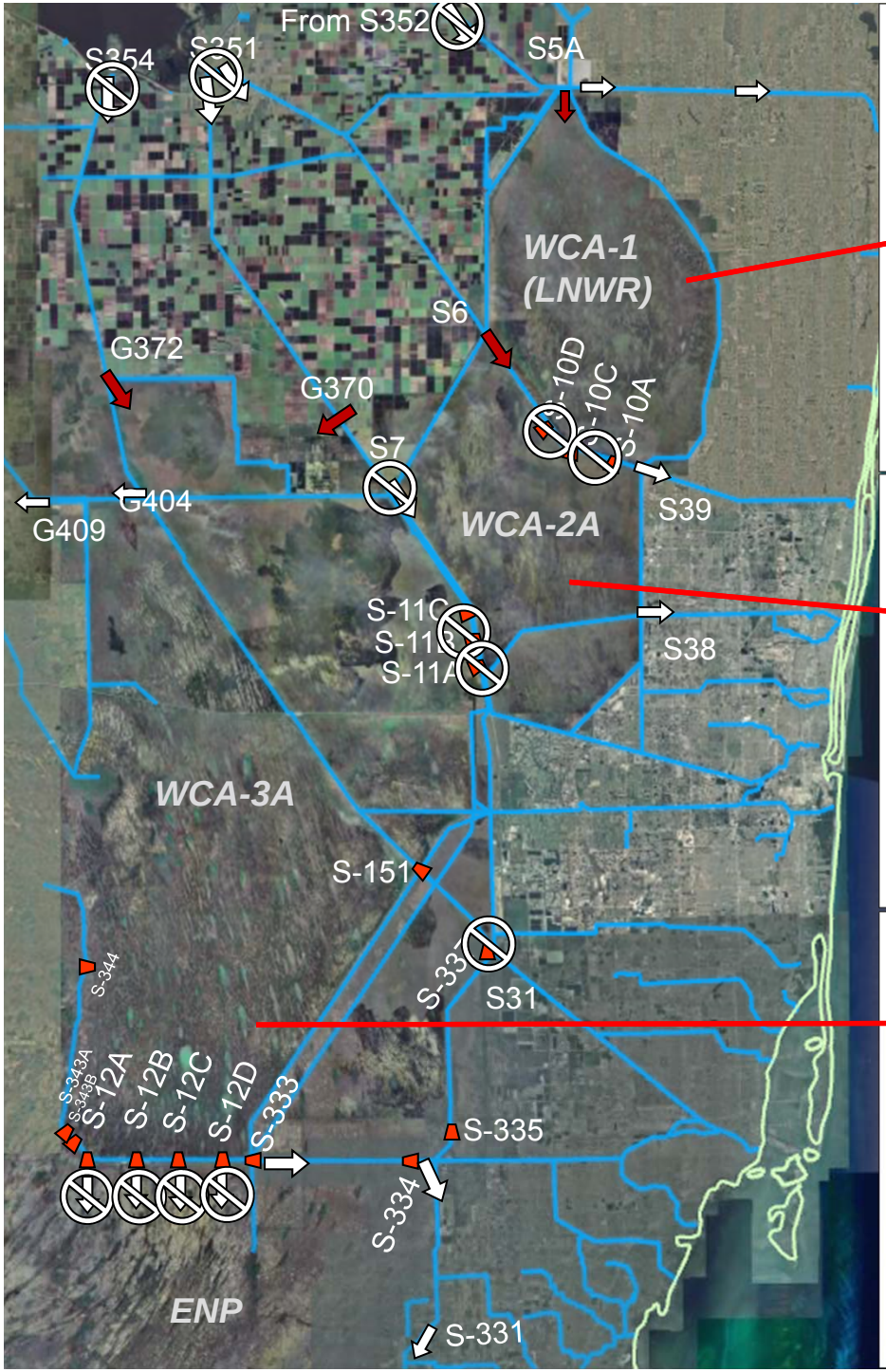
Apr. 5, 2011

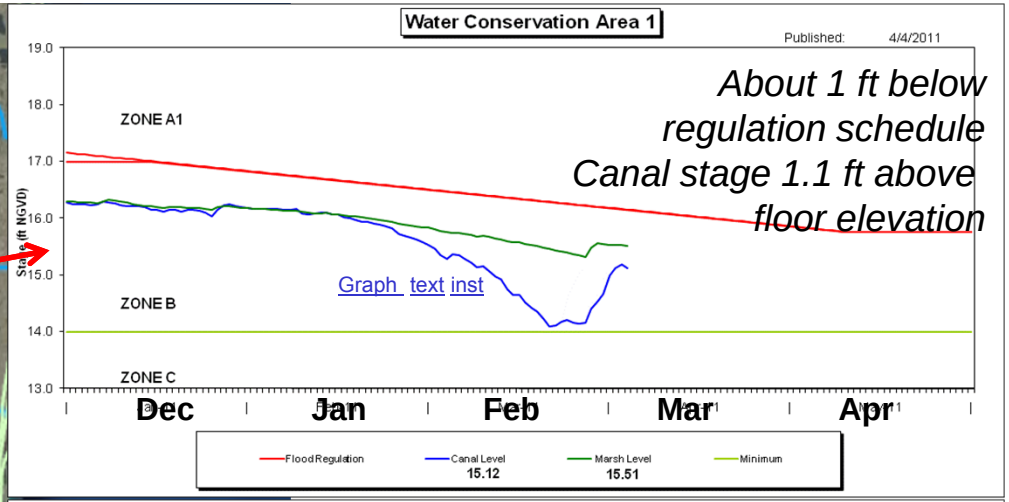


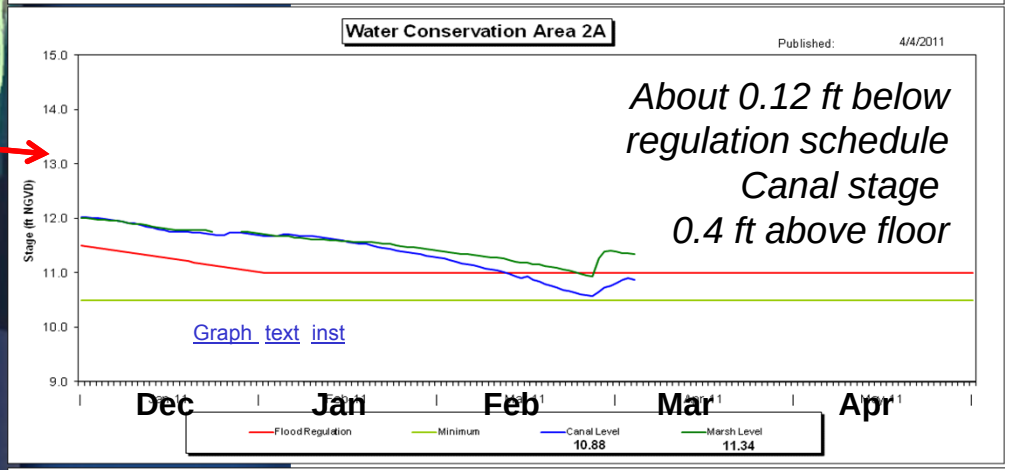
Rivers and canals
Roads and highways
County boundaries
Telemetry site

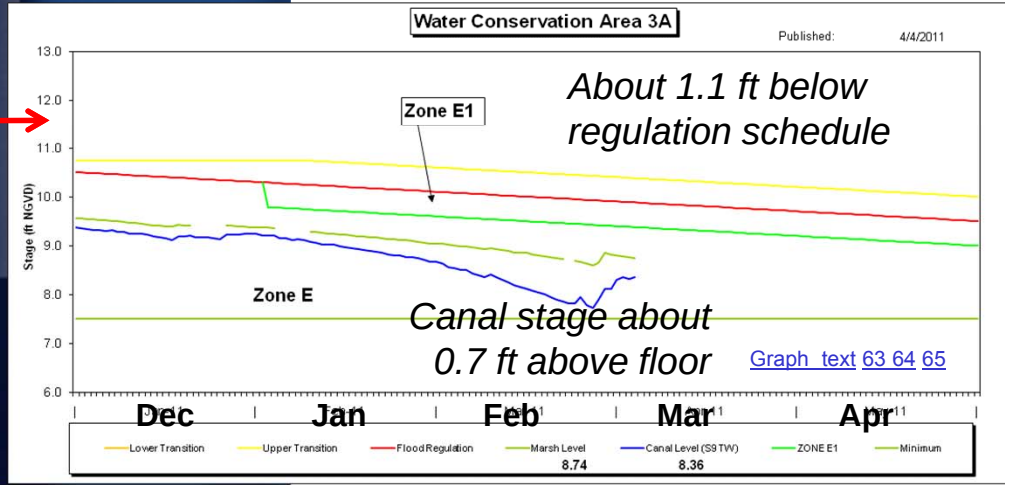
Water level compared to historical data, after long-term trends are rem
- Insufficient information available to compute water-level statistics
- In lowest 10 percent of past water elevations
- Within lowest 10 to 30 percent of past water elevations
- Within 20 percent of the median of past water elevations
- Within highest 10 to 30 percent of past water elevations
- In highest 10 percent of past water elevations

Water levels at selected sites in South Florida,
Based on PROVISIONAL DATA, as of April 5, 2011.


From S352
S354
S351
S5A
WCA-1
(LNWR)
S6
G372
G370
S7
G404
G409
WCA-2A
S-10D
S-10C
S-10A
S39
S-11C
S-11B
S-11A
S38
WCA-3A
S-151
S-344
S-337
S31
S-343A
S-343B
S-12A
S-12B
S-12C
S-12D
S-333
S-335
S-334
ENP
S-331


Water Conservation Area 1
Published: 4/4/2011
ZONE A1
ZONE B
ZONE C
Stage (ft NGVD)
Graph text inst
Dec
Jan
Feb
Mar
Apr
Flood Regulation
Canal Level
15.12
Marsh Level
15.51
Minimum
About 1 ft below regulation schedule
Canal stage 1.1 ft above floor elevation


Water Conservation Area 2A
Published: 4/4/2011
Stage (ft NGVD)
Graph text inst
Dec
Jan
Feb
Mar
Apr
Flood Regulation
Minimum
Canal Level
10.88
Marsh Level
11.34
About 0.12 ft below regulation schedule
Canal stage 0.4 ft above floor

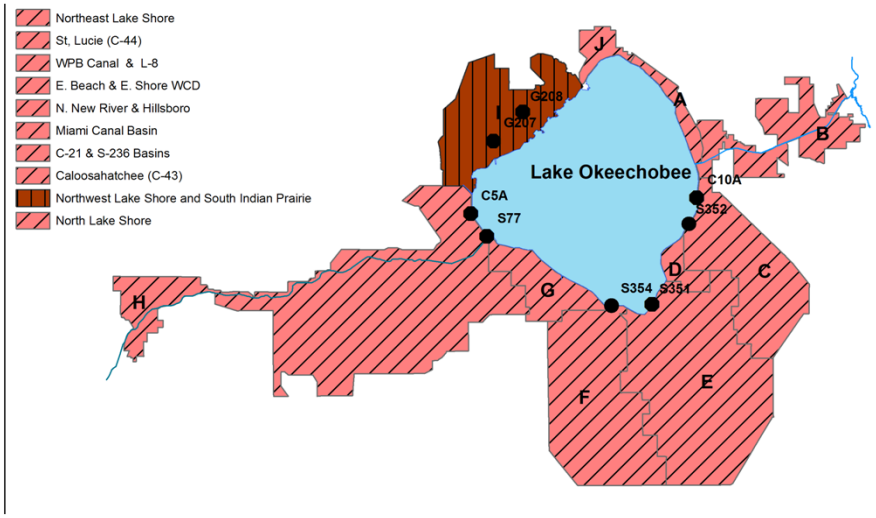

Water Conservation Area 3A
Published: 4/4/2011
Zone E1
Zone E
Stage (ft NGVD)
Graph text 63 64 65
Dec
Jan
Feb
Mar
Apr
Lower Transition
Upper Transition
Flood Regulation
Marsh Level
8.74
Canal Level (S9TW)
8.36
ZONE E1
Minimum
About 1.1 ft below regulation schedule
Canal stage about 0.7 ft above floor

On March 10, 2011, SFWMD approved a “Water Shortage Warning” for all the residents and businesses throughout the District’s 16-county region to voluntarily reduce water use. Under a separate water shortage order, specific permitted water users in the L-8 Basin of Palm Beach County are required to reduce withdrawals by 15 percent.

On March 21, 2011, SFWMD issued water shortage orders and declared water use restrictions for the entire District.

Phase I – Lake Okeechobee Service Area (LOSA)

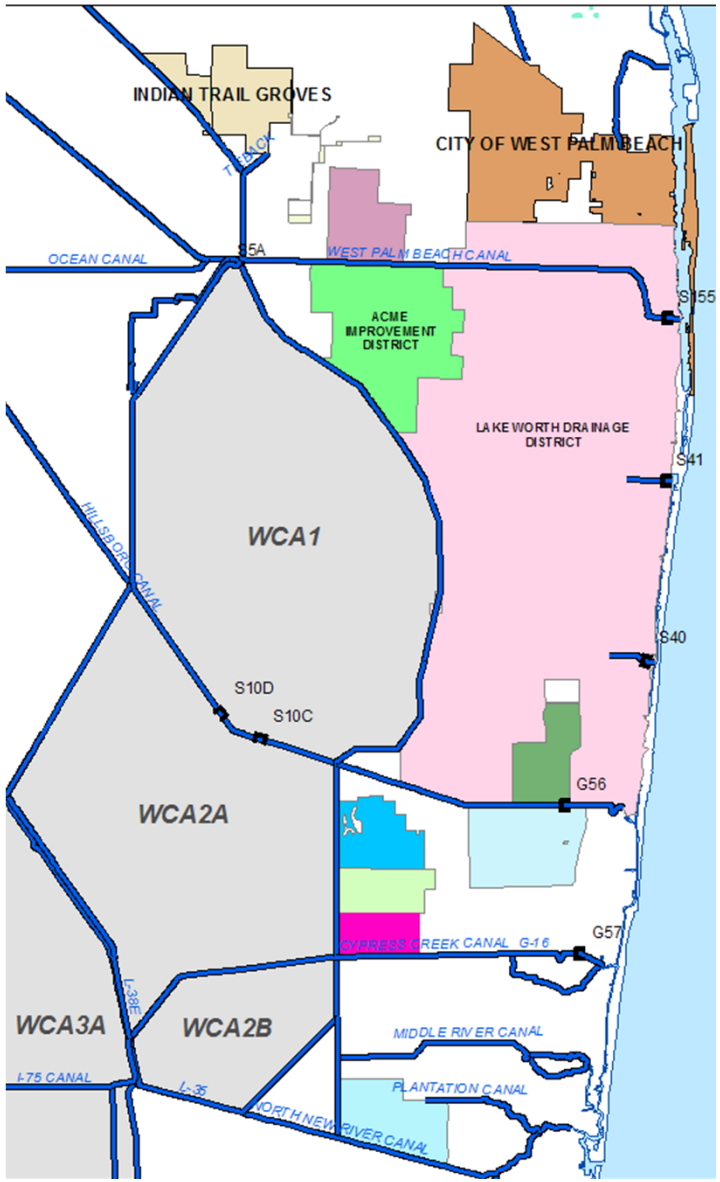
15% cutback – surface water users (e.g., agriculture)



- **March 18, 2011 – Lake below trigger line**
- **March 21, 2011 – Order executed**
- **March 26, 2011 – Order effective**

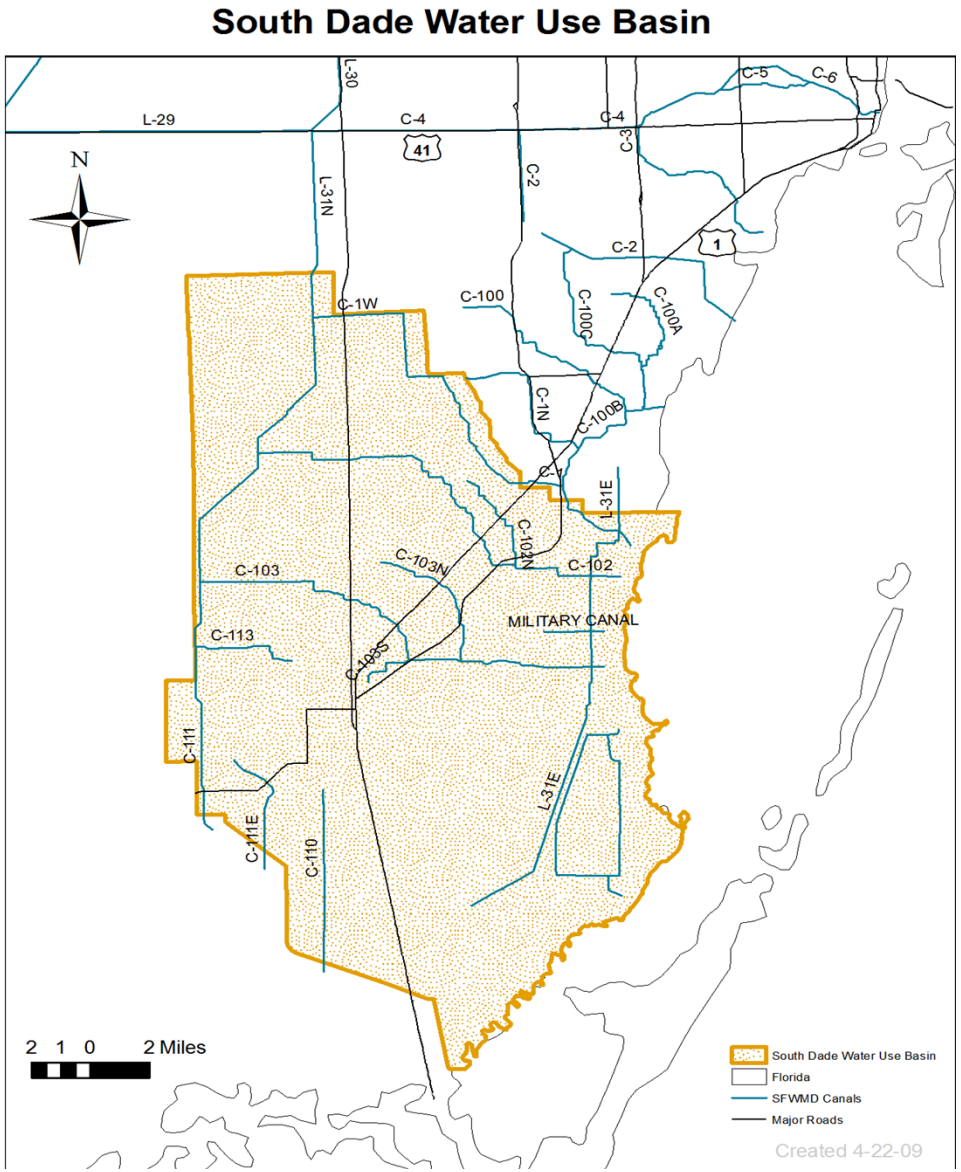
Phase I – Palm Beach & Broward Counties

- 15% cutback
  - Diversion & Impoundments
  - Agriculture
  - Nurseries



Phase I – South Miami-Dade Basin

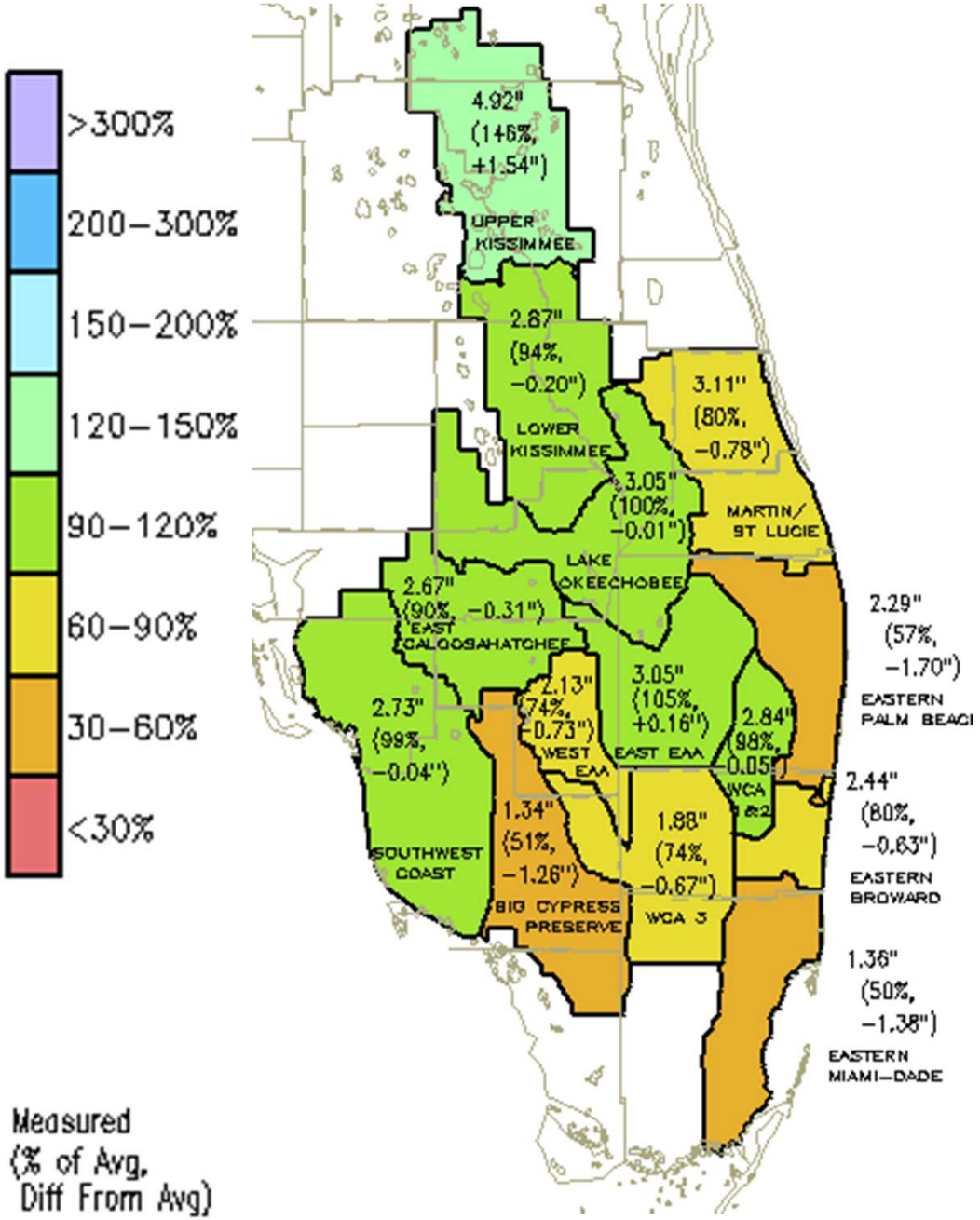
- Limits irrigation times for agriculture and nurseries
- Designed to achieve 15 percent reduction in water use



District-Wide

- Phase I -- Golf Courses – 15% cutback
- Phase II -- Residential Landscape Irrigation – 2 days per week
  - Even Addresses – Thursday & Sunday
  - Odd Addresses – Wednesday & Saturday
  - No irrigation between 10 a.m. and 4 p.m.
  - Applies to all sources (wells, canals, utility)
  - Exempt
    - Reclaimed water

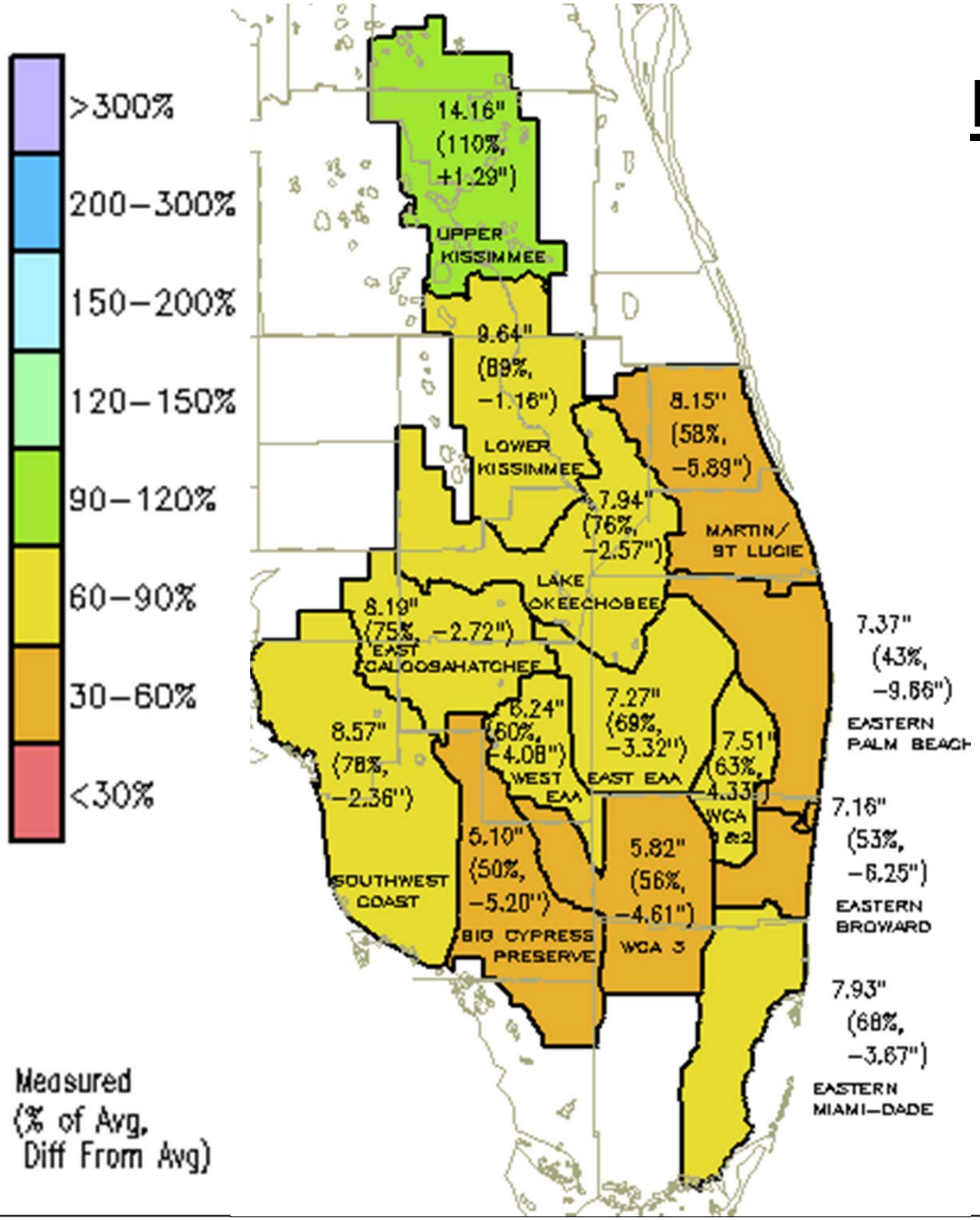
April 2011



SFWMD 2011
March Rain
Mar 2 – Mar 31

DISTRICT-WIDE: 2.72”
(90% of Avg, or -0.32”)

- **Basins north and west of LOK received normal or above normal rainfall**
- **LOK, East EAA and WCAs 1 an 2 also received normal rainfall**
- **Basins along the east coast, WCA3, West EAA, and Big Cypress Preserve receive less than average**



SFWMD 2010-11

Dry Season* Rainfall

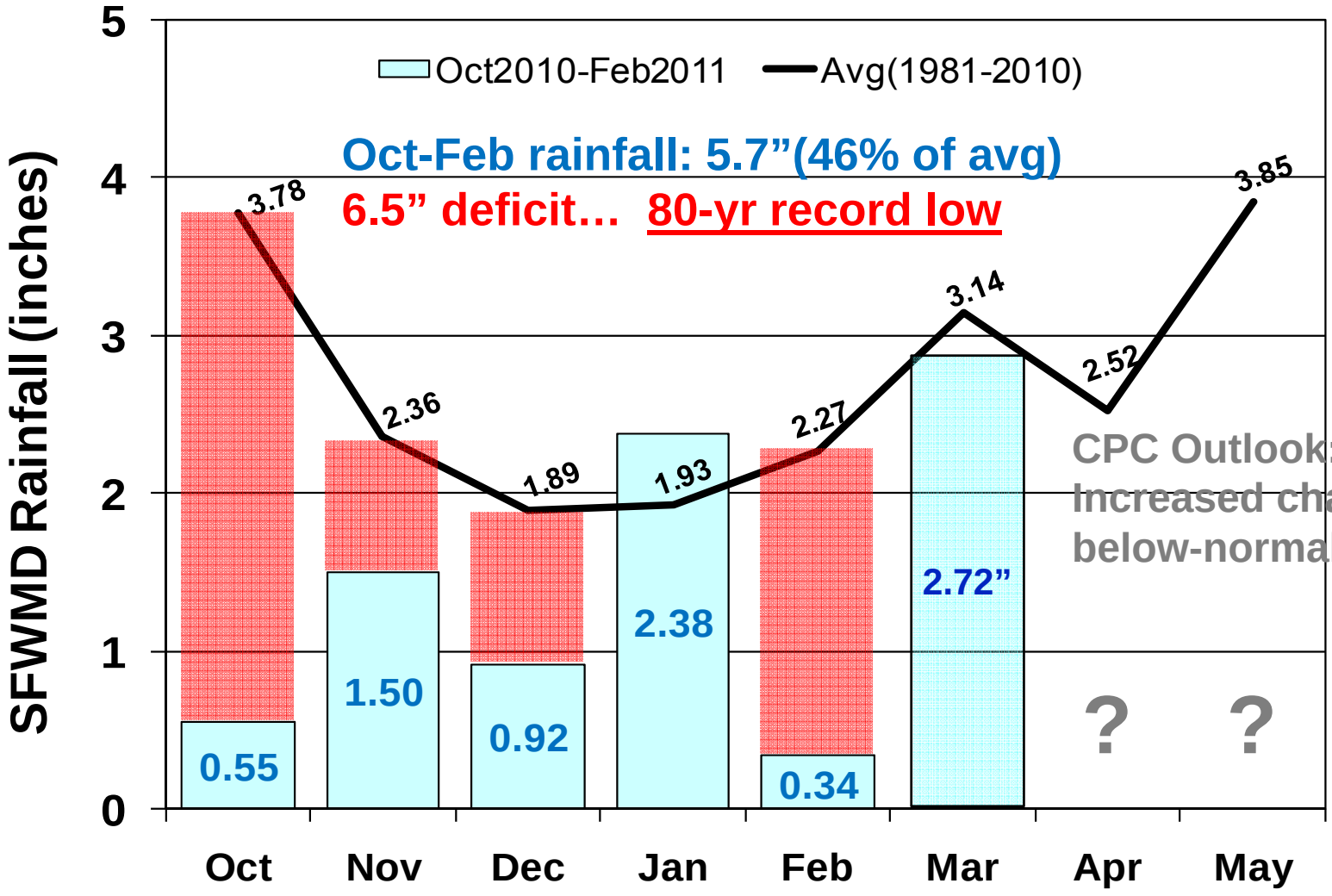
Nov 2 – Apr 01

DISTRICT-WIDE: 8.25” (71% of Avg, or -3.34”)

- **Typical influence from La Nina during Nov-Mar is about a 4-inch deficit**
- **Above-average rain in January**
- **The dry season started early with a record rainfall deficit in October**
- **October-Feb rainfall was less than half the average. A record low since recordkeeping began in 1932**

** 2010-11 Dry season started in October*

SFWMD Rainfall Distribution Comparison (October-May)



** March total through the 31st*

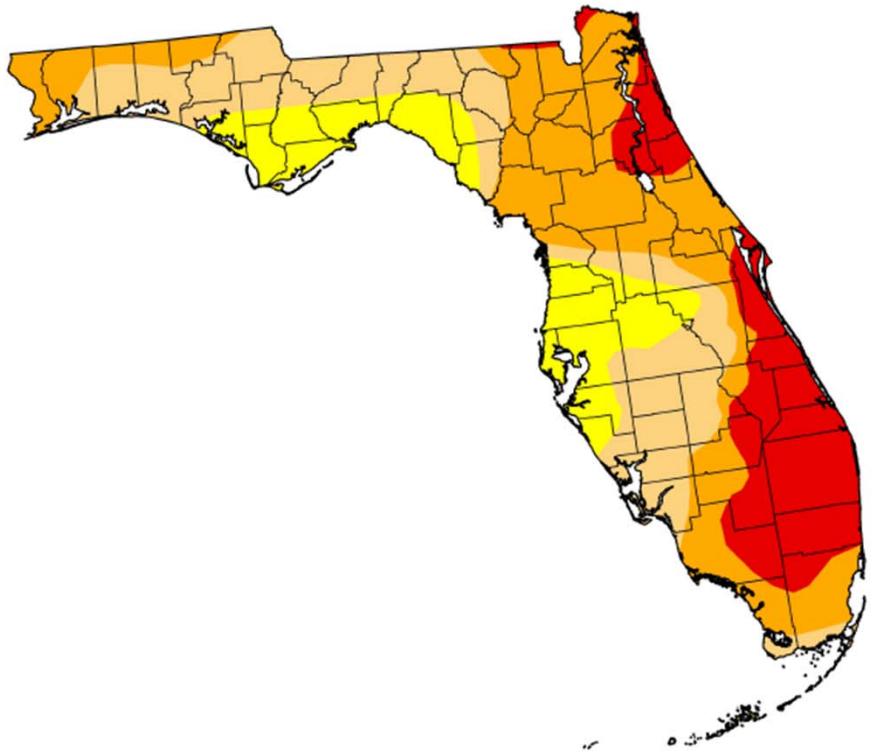
U.S. Drought Monitor

Florida

March 29, 2011
Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	0.04	99.96	82.72	54.43	20.42	0.00
Last Week (03/22/2011 map)	0.73	99.27	91.34	56.12	21.13	0.00
3 Months Ago (12/28/2010 map)	0.18	99.82	86.04	50.84	20.21	0.00
Start of Calendar Year (12/28/2010 map)	0.18	99.82	86.04	50.84	20.21	0.00
Start of Water Year (09/28/2010 map)	54.97	45.03	18.02	4.22	0.00	0.00
One Year Ago (03/23/2010 map)	100.00	0.00	0.00	0.00	0.00	0.00



Intensity:

- *D0 Abnormally Dry*
- *D1 Drought - Moderate*
- *D2 Drought - Severe*
- *D3 Drought - Extreme*
- *D4 Drought - Exceptional*

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

http://drought.unl.edu/dm

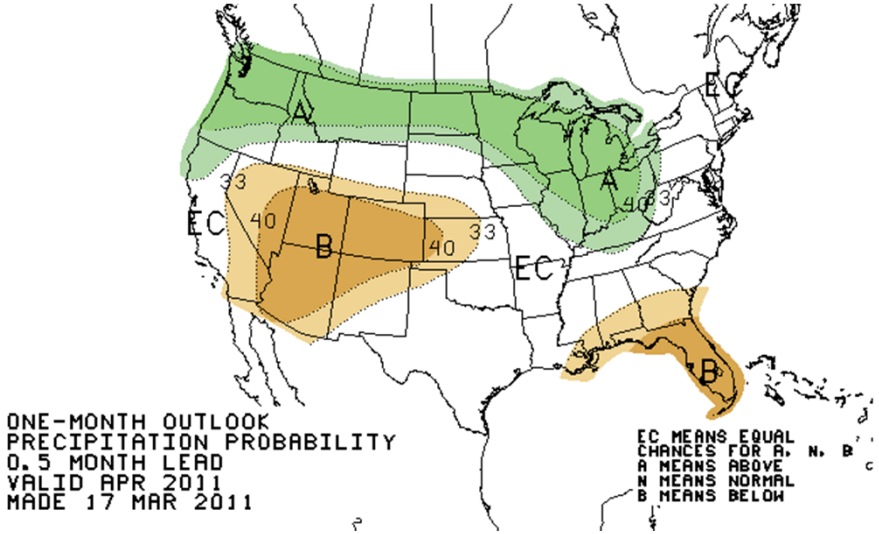
Released Thursday, March 31, 2011

Eric Luebehusen, United States Department of Agriculture

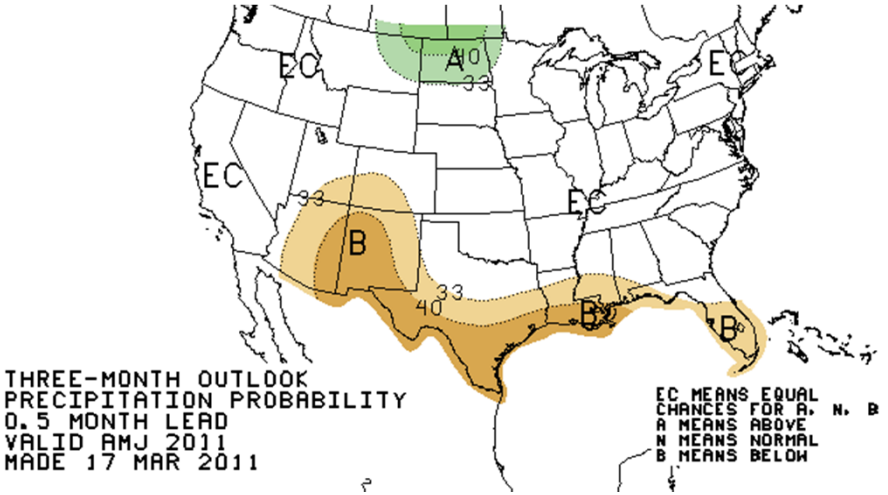
U. S. Seasonal Precipitation Outlook

National Climate Prediction Center (CPC)

April 2011



April-May-June 2011

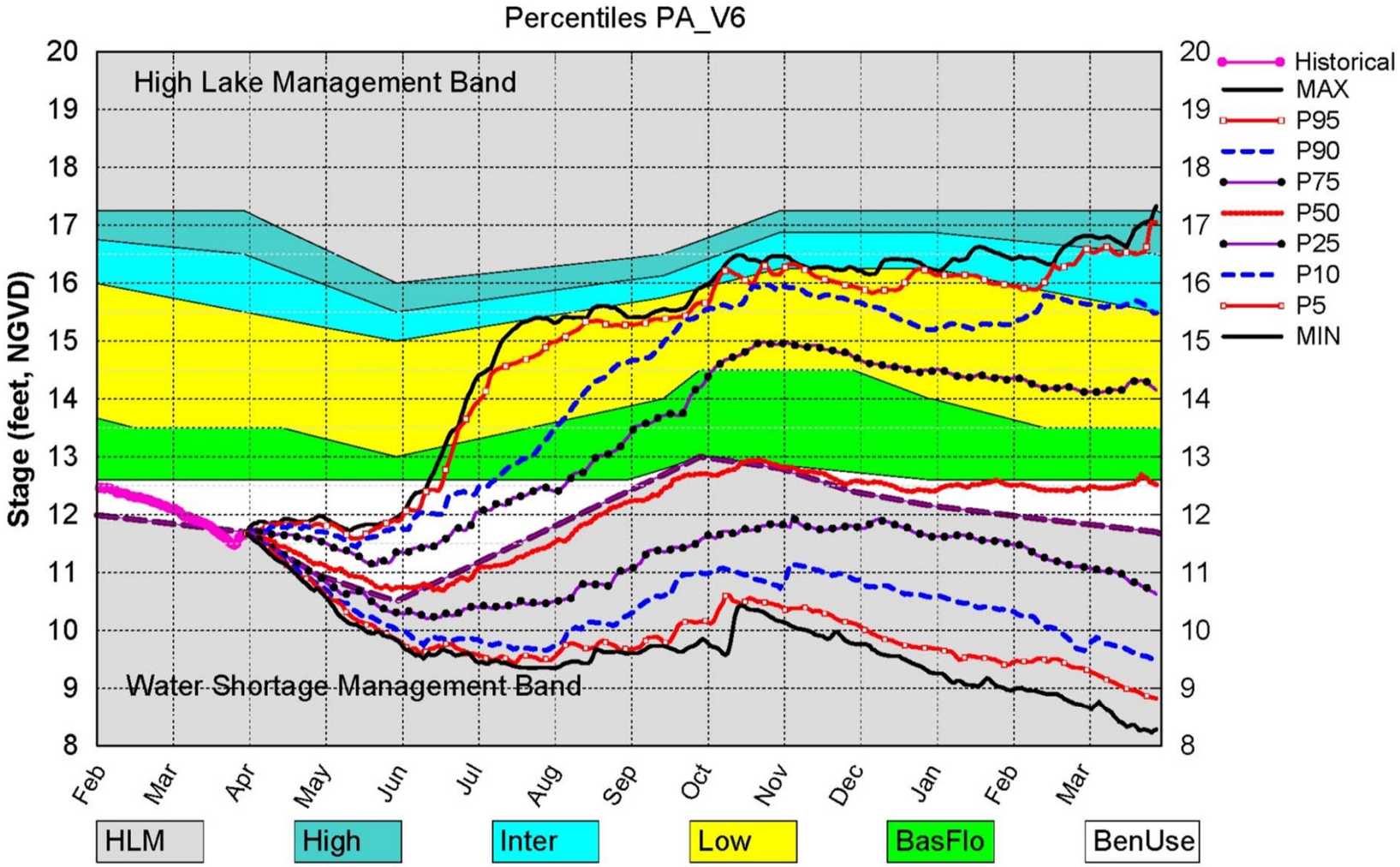


<u>La Niña conditions are expected to continue into the 2010-2011 dry season</u>

The current precipitation outlook for central and southern Florida is:

- increased chance of below-normal (B) rainfall for April.
- increased chance of below-normal (B) rainfall for April-June 2011
- increased chance of below-normal (B) rainfall for the entire 2010-11 dry season

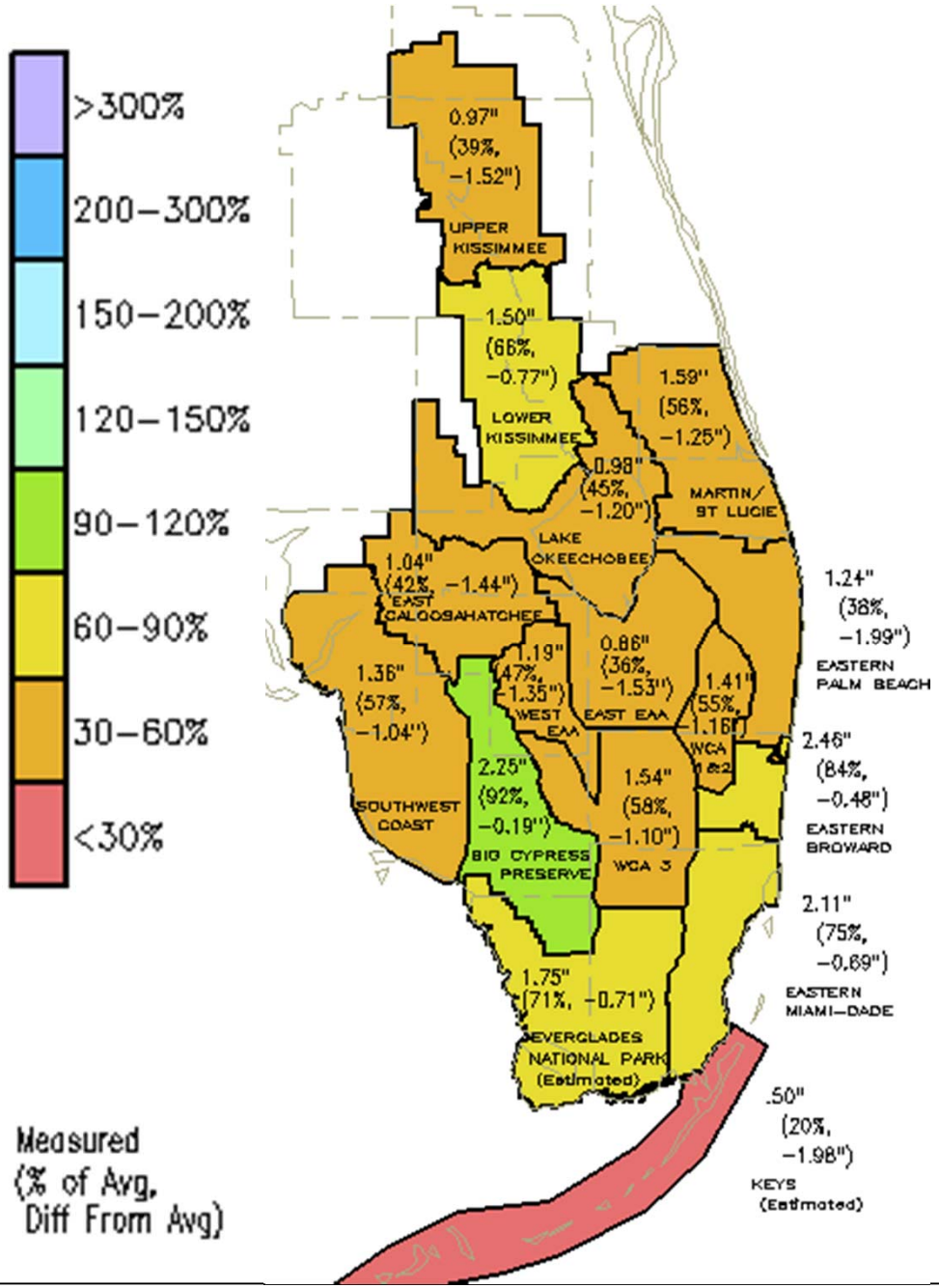
Lake Okeechobee SFWMM April 2011 Position Analysis



(See assumptions on the Position Analysis Results website)

Wed Apr 6 14:14:46 2011

May 2011

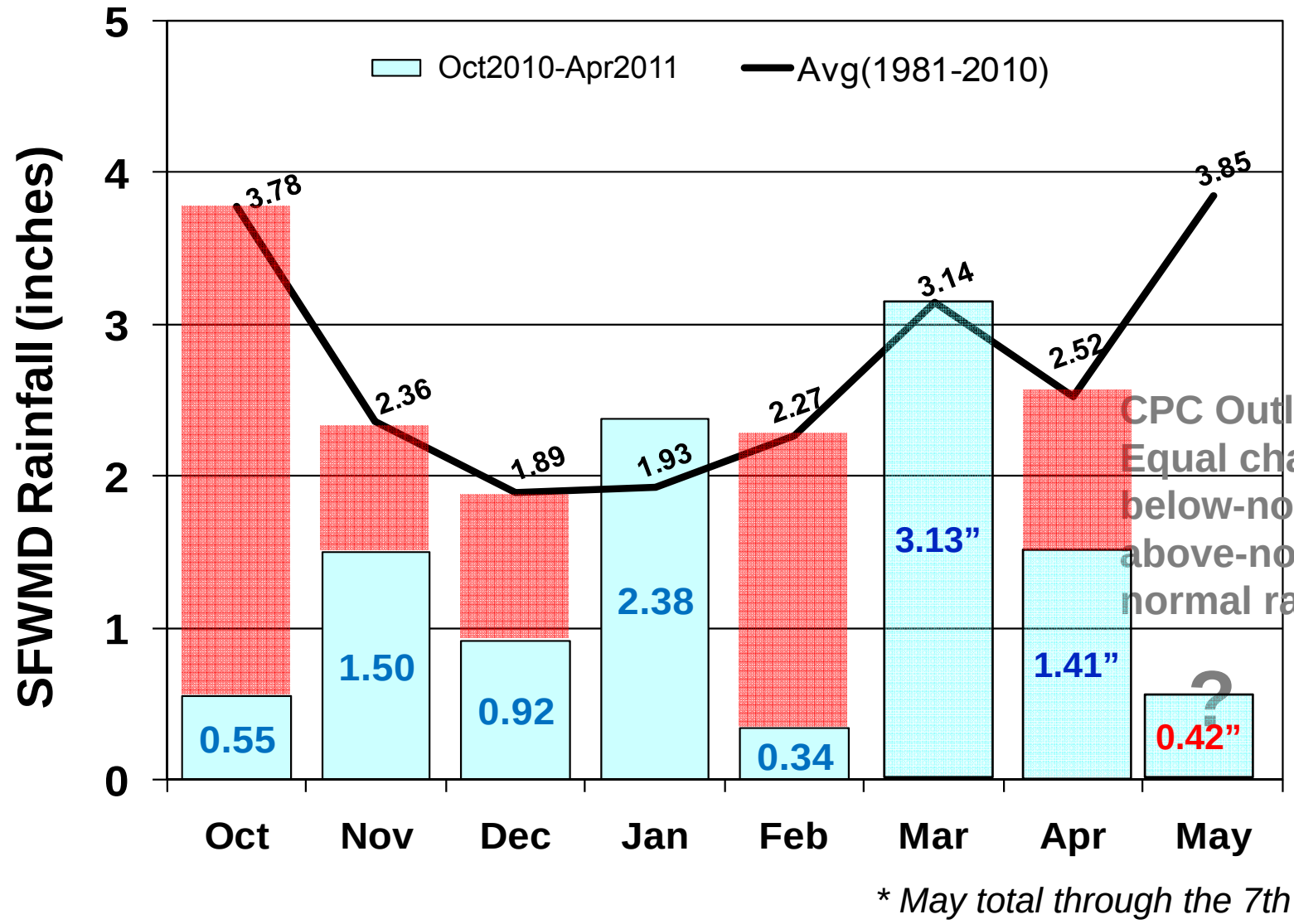


SFWMD 2011
April Rain
Apr 2 – May 01

DISTRICT-WIDE: 1.41” (56% of Avg, or -1.11”)

- **All basins received less than normal rainfall**
- **Most basins received less than 60% normal**
- **Few exceptions include: Lower Kissimmee (66%); Big Cypress Preserve (92%); Eastern Broward (84%) and Eastern Miami Dade (75%)**

SFWMD Rainfall Distribution Comparison (October-May)



CPC Outlook: Equal chance of below-normal, above-normal and normal rainfall

** May total through the 7th*

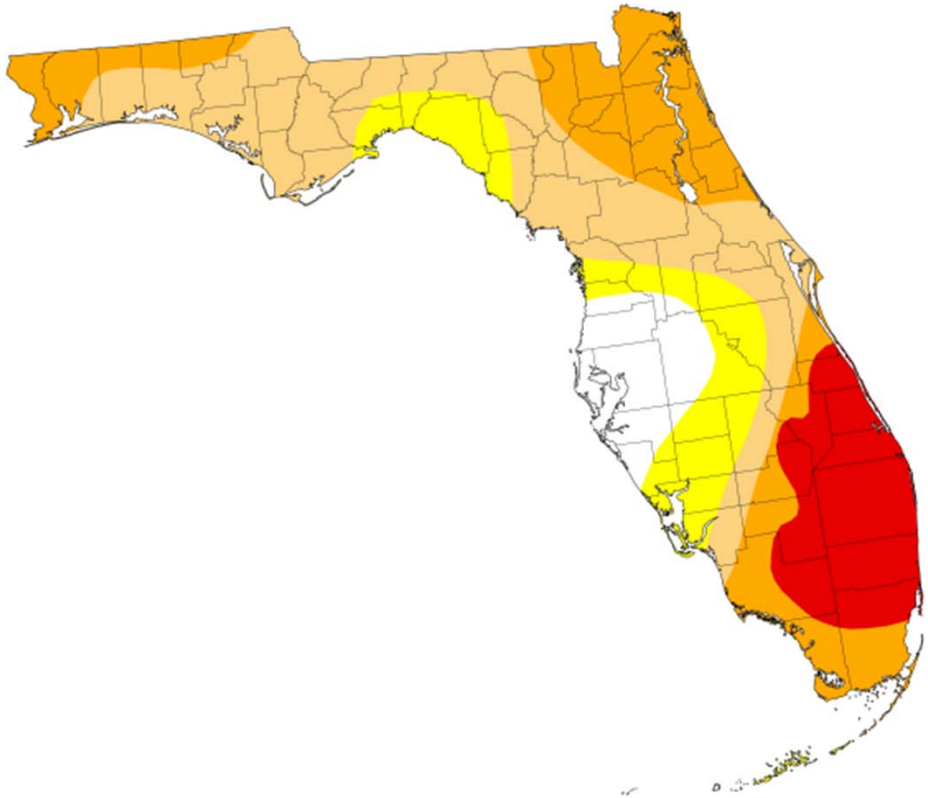
U.S. Drought Monitor

Florida

May 3, 2011
Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	8.72	91.28	76.21	41.19	15.63	0.00
Last Week (04/26/2011 map)	8.72	91.28	76.21	41.19	15.63	0.00
3 Months Ago (02/01/2011 map)	0.87	99.13	84.98	50.76	13.71	0.00
Start of Calendar Year (12/28/2010 map)	0.18	99.82	86.04	50.84	20.21	0.00
Start of Water Year (09/28/2010 map)	54.97	45.03	18.02	4.22	0.00	0.00
One Year Ago (04/27/2010 map)	94.58	5.42	0.00	0.00	0.00	0.00



Intensity:

- *D0 Abnormally Dry*
- *D1 Drought - Moderate*
- *D2 Drought - Severe*
- *D3 Drought - Extreme*
- *D4 Drought - Exceptional*

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

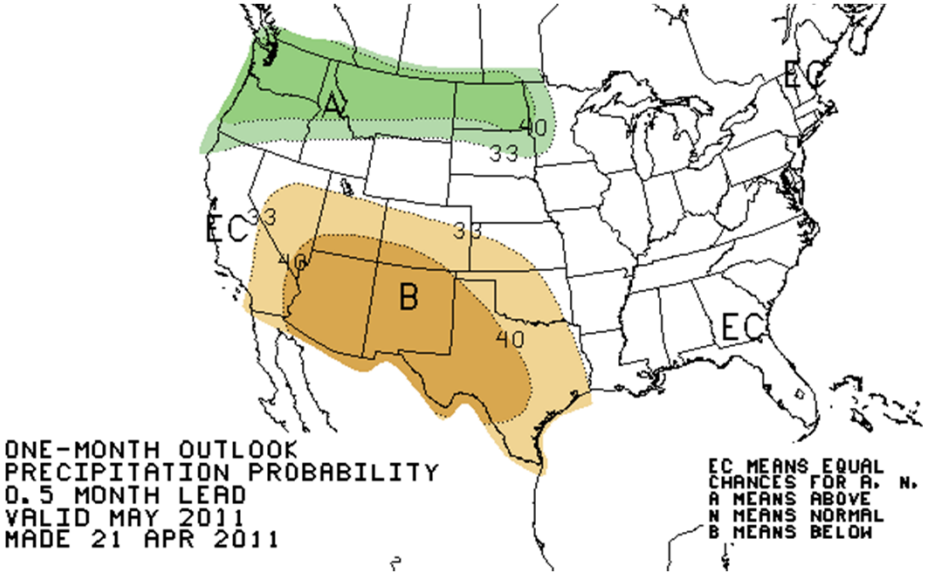
http://drought.unl.edu/dm

Released Thursday, May 5, 2011
Rich Tinker, NOAA/NWS/NCEP/CPC

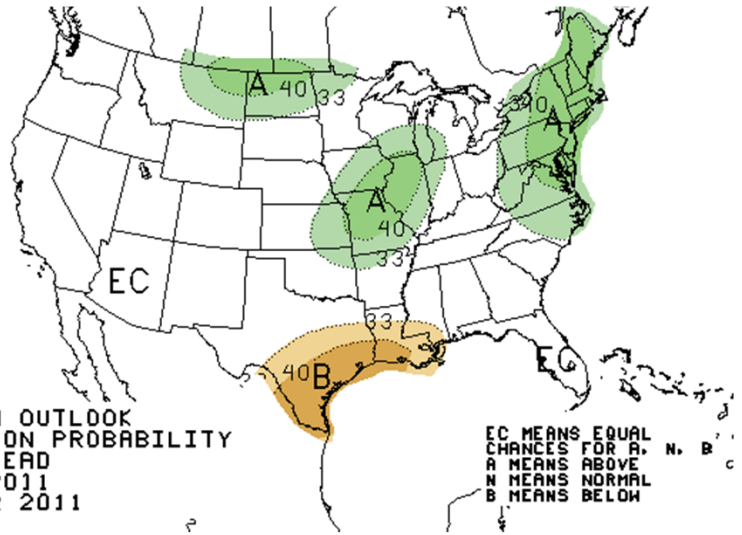
U. S. Seasonal Precipitation Outlook

National Climate Prediction Center (CPC)

May 2011



May-June-July 2011

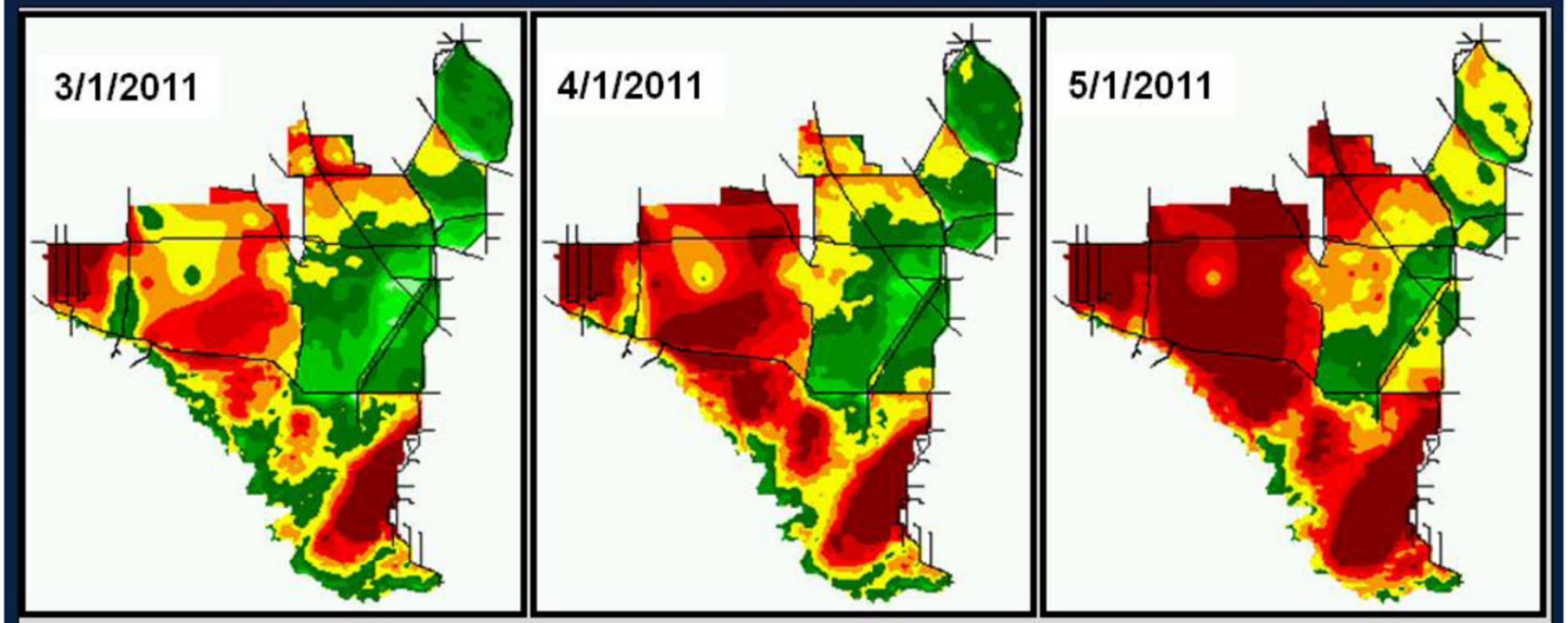


The current precipitation outlook for central and southern Florida is:

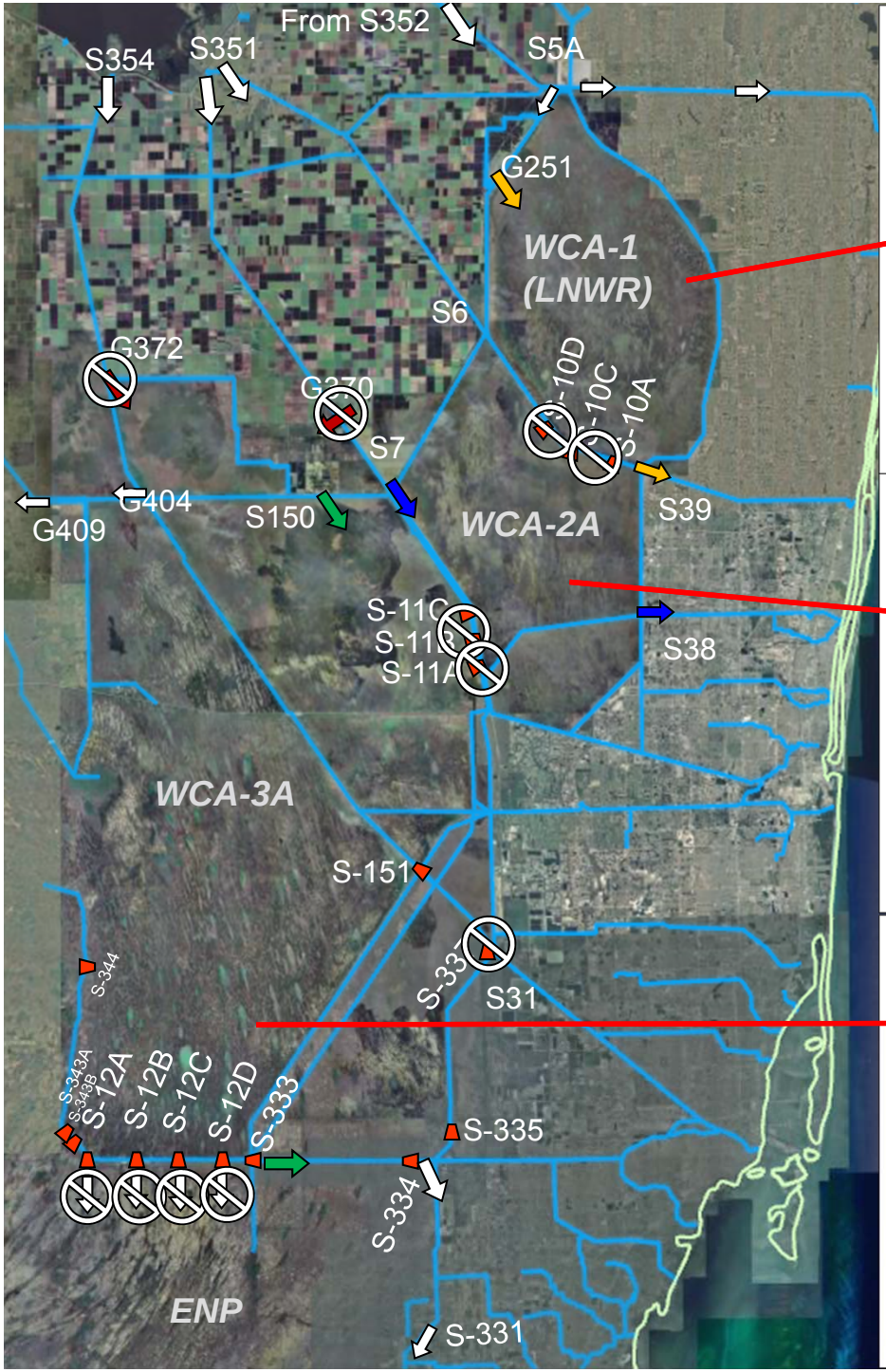
- Equal chance of above-normal (A), below-normal (B) and normal (N) rainfall for May.
- Equal chance of above-normal (A), below-normal (B) and normal (N) rainfall for May-June-July 2001
- A transition to ENSO-neutral conditions is expected by June 2011

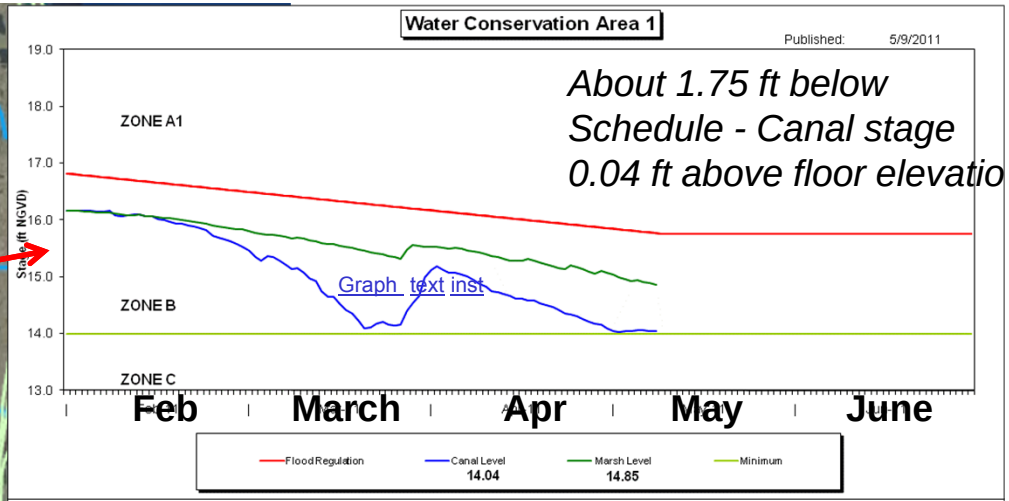
SOUTH FLORIDA WATER MANAGEMENT DISTRICT

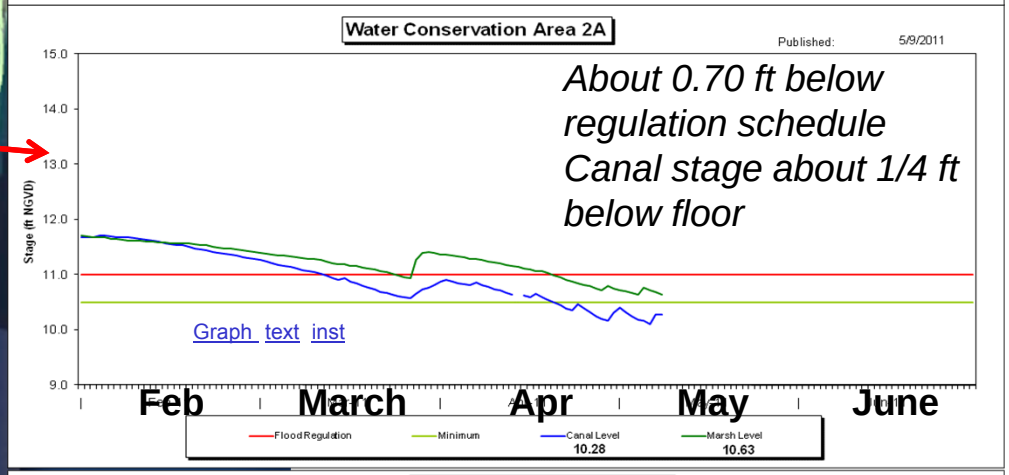
SFWDAT Water Depth Monthly Snapshots

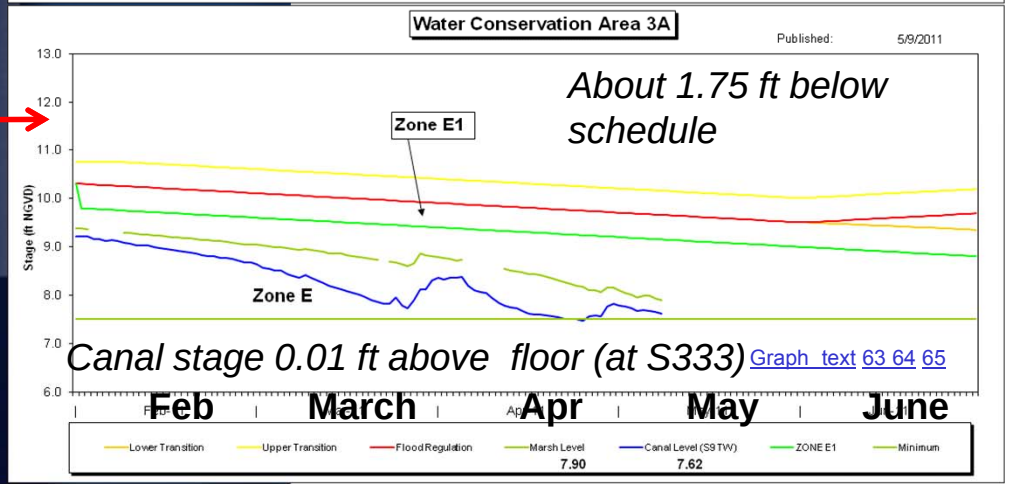


South Florida Water Depth Assessment Tool (SFWDAT)


From S352
S354
S351
S5A
G251
WCA-1
(LNWR)
S6
G372
S7
S-10D
S-10C
S-10A
G404
G409
S150
WCA-2A
S39
S-11C
S38
WCA-3A
S-151
S-344
S31
S-343A
S-343B
S-12A
S-12B
S-12C
S-12D
S-333
S-335
S-334
ENP
S-331


Water Conservation Area 1
Published: 5/9/2011
About 1.75 ft below Schedule - Canal stage 0.04 ft above floor elevatio
ZONE A1
ZONE B
ZONE C
Stage (ft NGVD)
Graph text inst
Feb
March
Apr
May
June
Flood Regulation
Canal Level
14.04
Marsh Level
14.85
Minimum

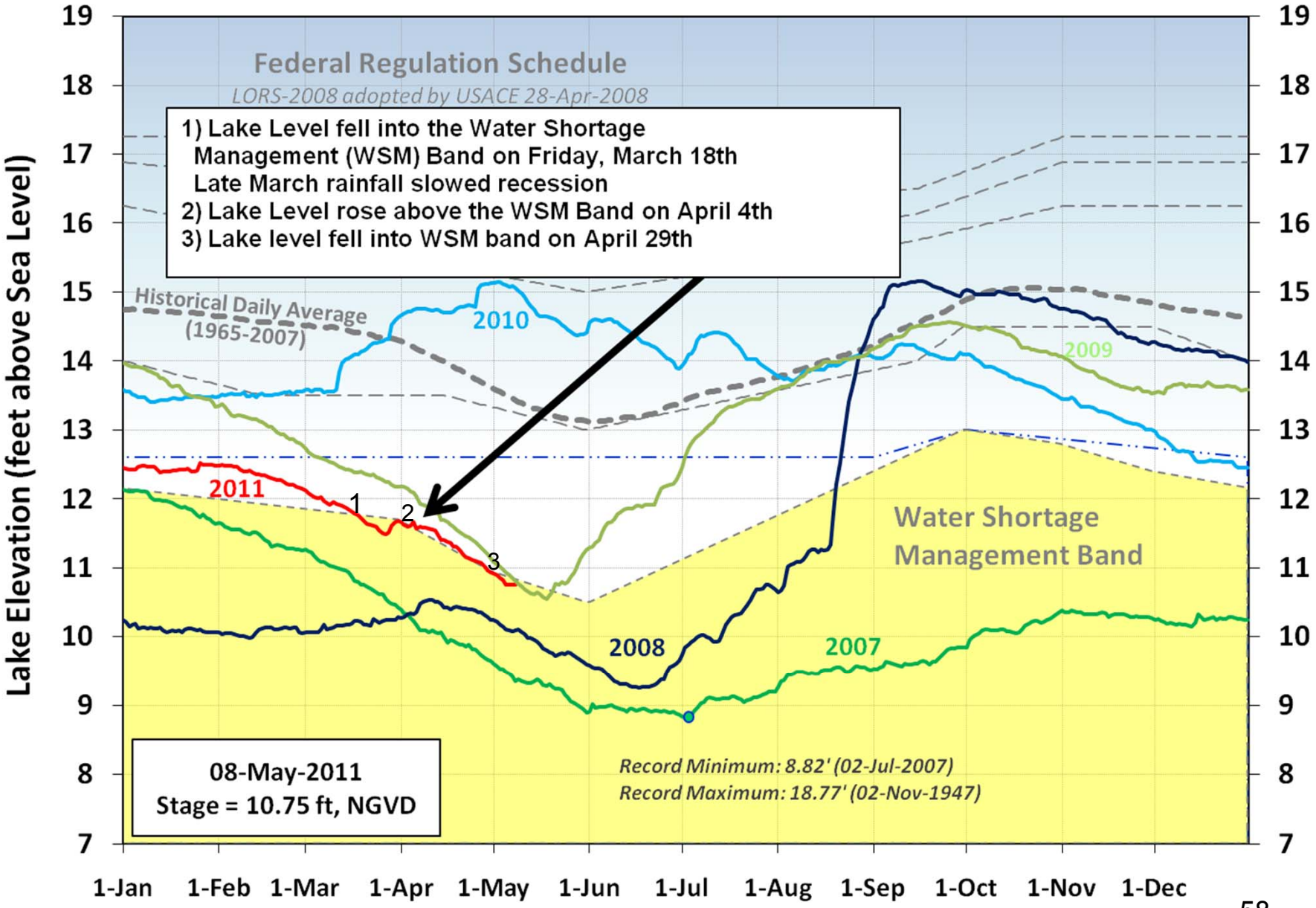

Water Conservation Area 2A
Published: 5/9/2011
About 0.70 ft below regulation schedule Canal stage about 1/4 ft below floor
Stage (ft NGVD)
Graph text inst
Feb
March
Apr
May
June
Flood Regulation
Minimum
Canal Level
10.28
Marsh Level
10.63


Water Conservation Area 3A
Published: 5/9/2011
About 1.75 ft below schedule
Zone E1
Zone E
Stage (ft NGVD)
Canal stage 0.01 ft above floor (at S333)
Graph text 63 64 65
Feb
March
Apr
May
June
Lower Transition
Upper Transition
Flood Regulation
Marsh Level
7.90
Canal Level (S9TW)
7.62
ZONE E1
Minimum

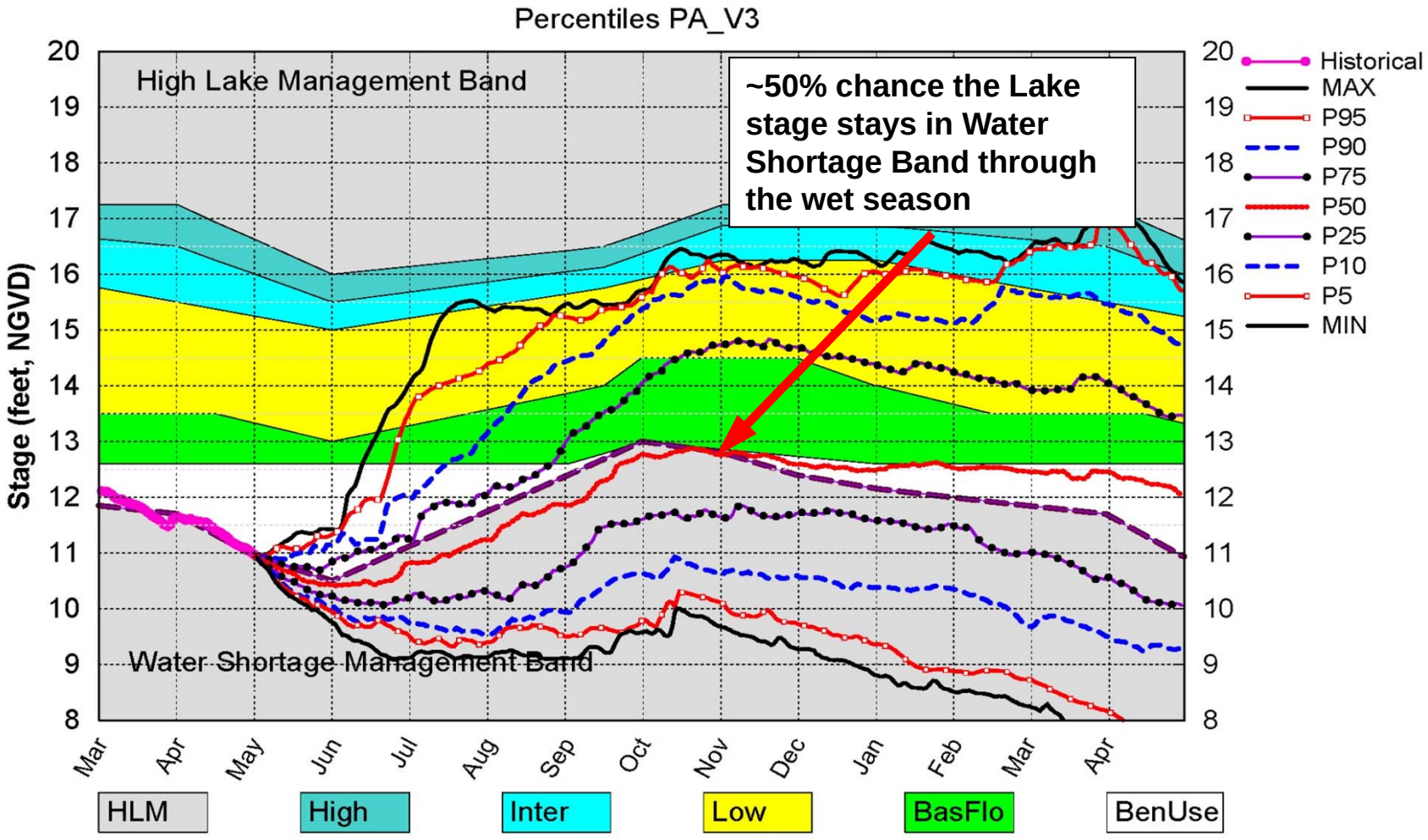
Low Canal/Lake Levels

- Complaints from local governments, HOAs
- Water levels below WCA floor elevations – no releases to urban areas except if from another source
- SFWMD Response
  - Fact sheets transmitted to 2,299 HOAs
  - Meetings with City managers in Northwest Broward, especially C-14 Basin
  - Emphasis on warnings to reinforce conservation ethic

Lake Okeechobee Water Level Comparison



Lake Okeechobee SFWMM May 2011 Position Analysis

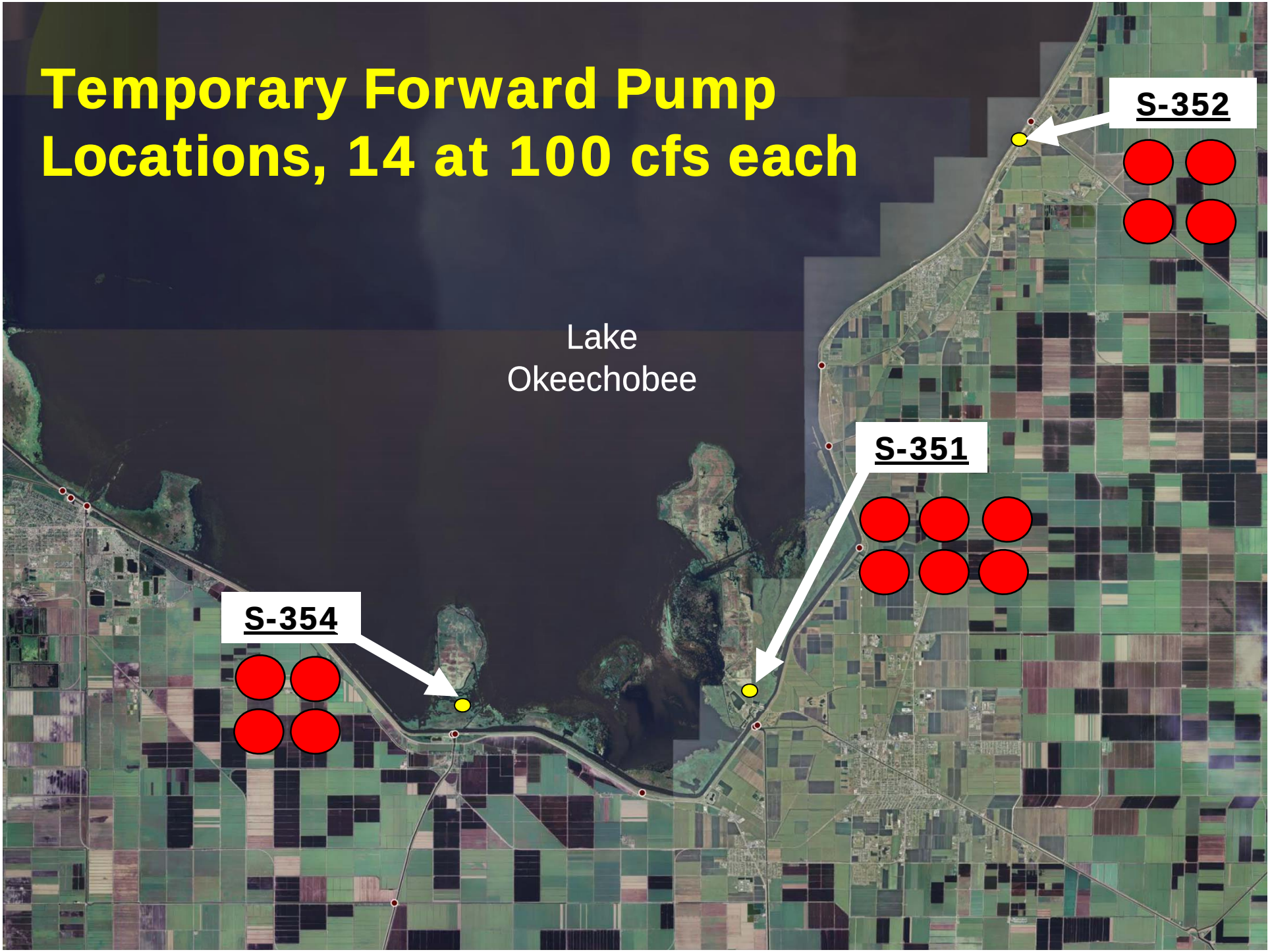


(See assumptions on the Position Analysis Results website)

Thu May 5 12:02:57 2011

Temporary Forward Pumps

- Designed to deliver water from Lake Okeechobee south when level goes below 10.5 ft NGVD
- 1,400 cfs total capacity
- Coordinate installation with growers
- Installation once pumped capacity exceeds gravity flow
- Installed at S-352 and S-351 in 2011


Temporary Forward Pump Locations, 14 at 100 cfs each
S-352
Lake Okeechobee
S-351
S-354

Lake Okeechobee Water Shortage Plan (Chapter 40E-22, F.A.C.)

- Phase III or IV cutbacks may be imposed when water levels fall below or can be expected to fall below 10.5 ft NGVD by June 1st
- Additional Factors to consider (Ch. 40E-21, F.A.C.)
  - Inflows from Kissimmee River (800 cfs and declining)
  - Start of Wet Season ??
  - Position Analysis

On May 12, 2011 the District Governing Board declared a Modified Phase III Extreme Water Shortage in the Lake Okeechobee Service Area (LOSA) and imposes 45 percent cutbacks on surface water users.

June 2011

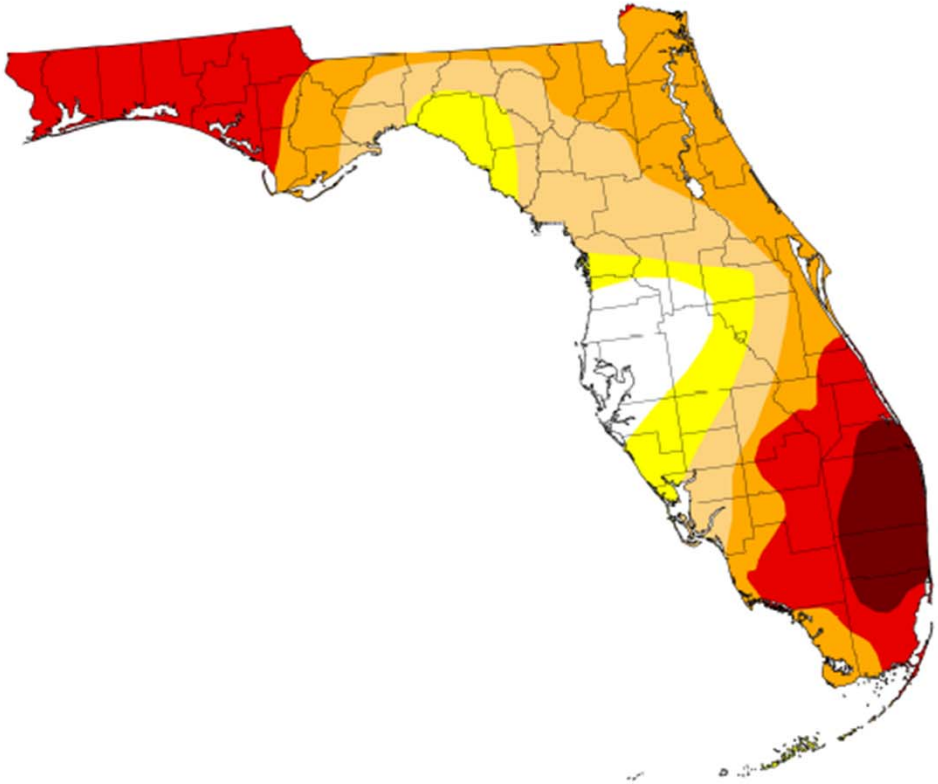
U.S. Drought Monitor

Florida

June 7, 2011
Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	7.11	92.89	81.58	59.37	32.45	7.08
Last Week (05/31/2011 map)	9.79	90.21	76.31	56.50	31.10	2.32
3 Months Ago (03/08/2011 map)	0.87	99.13	91.30	56.10	14.99	0.00
Start of Calendar Year (12/28/2010 map)	0.18	99.82	86.04	50.84	20.21	0.00
Start of Water Year (09/28/2010 map)	54.97	45.03	18.02	4.22	0.00	0.00
One Year Ago (06/01/2010 map)	100.00	0.00	0.00	0.00	0.00	0.00



Intensity:

- *D0 Abnormally Dry*
- *D1 Drought - Moderate*
- *D2 Drought - Severe*
- *D3 Drought - Extreme*
- *D4 Drought - Exceptional*

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

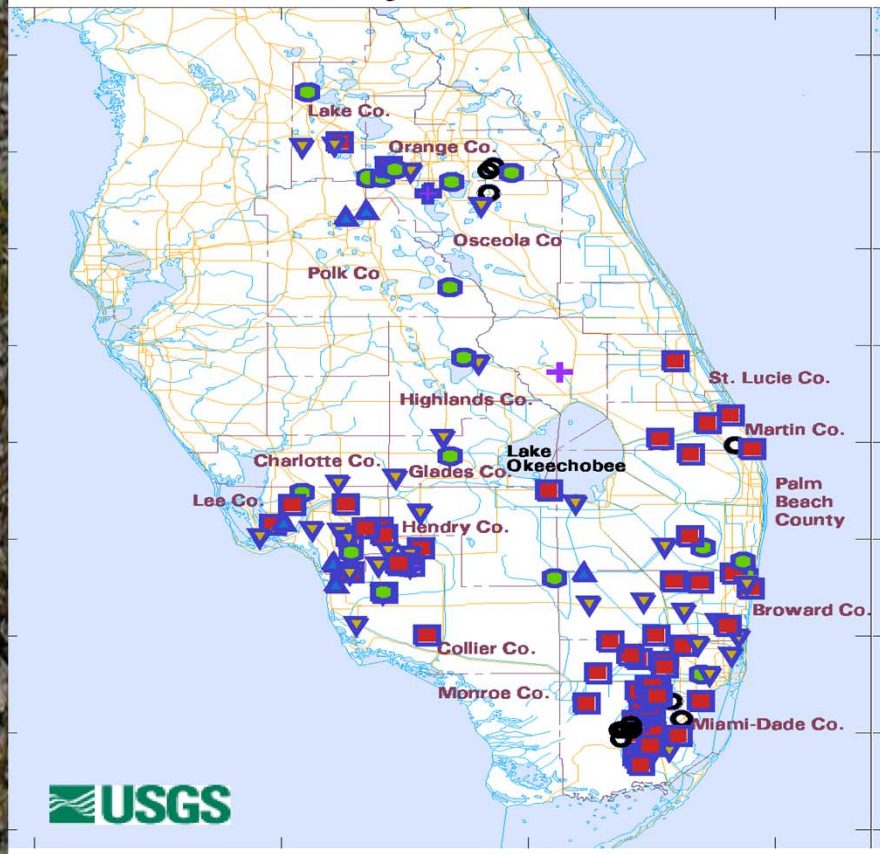
http://drought.unl.edu/dm

Released Thursday, June 9, 2011

Matthew Rosencrans, NOAA/NWS/NCEP/CPC

Groundwater Levels

May 8, 2011



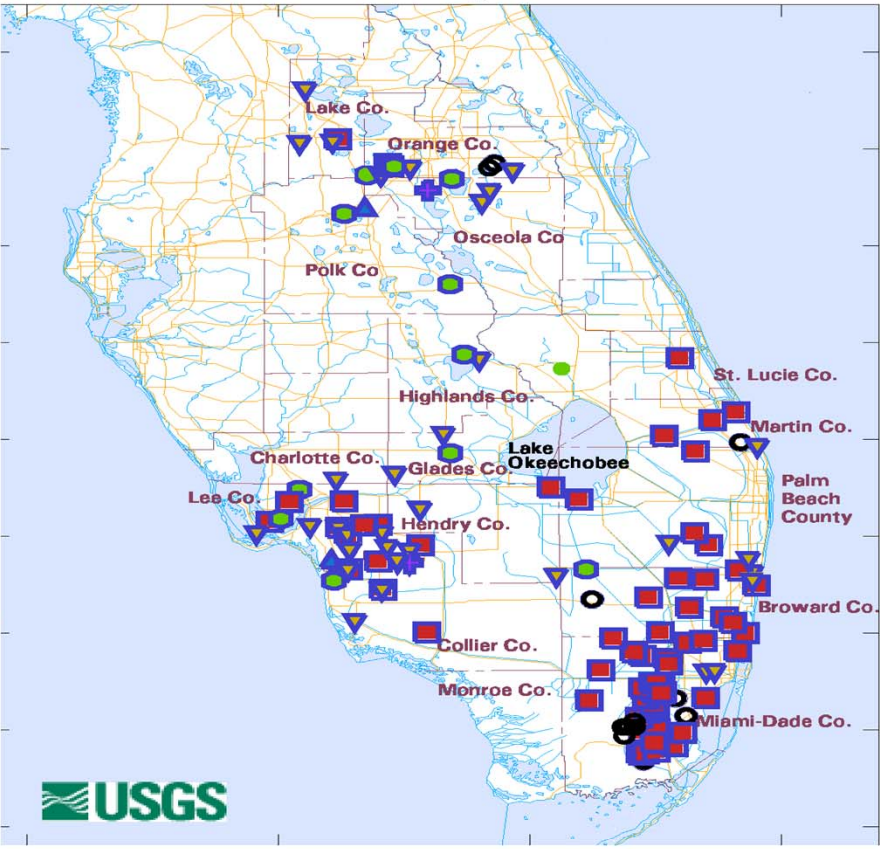
0 15 30 45 60 75 90 MILES
0 15 30 45 60 75 90 KILOMETERS

Rivers and canals
Roads and highways
County boundaries
Telemetry site

Water level compared to historical data, after long-term trends are rem
- Insufficient information available to compute water-level statistics
- In lowest 10 percent of past water elevations
- Within lowest 10 to 30 percent of past water elevations
- Within 20 percent of the median of past water elevations
- Within highest 10 to 30 percent of past water elevations
- In highest 10 percent of past water elevations

Water levels at selected sites in South Florida,
Based on PROVISIONAL DATA, as of May 8, 2011.

May 31, 2011



0 15 30 45 60 75 90 MILES
0 15 30 45 60 75 90 KILOMETERS

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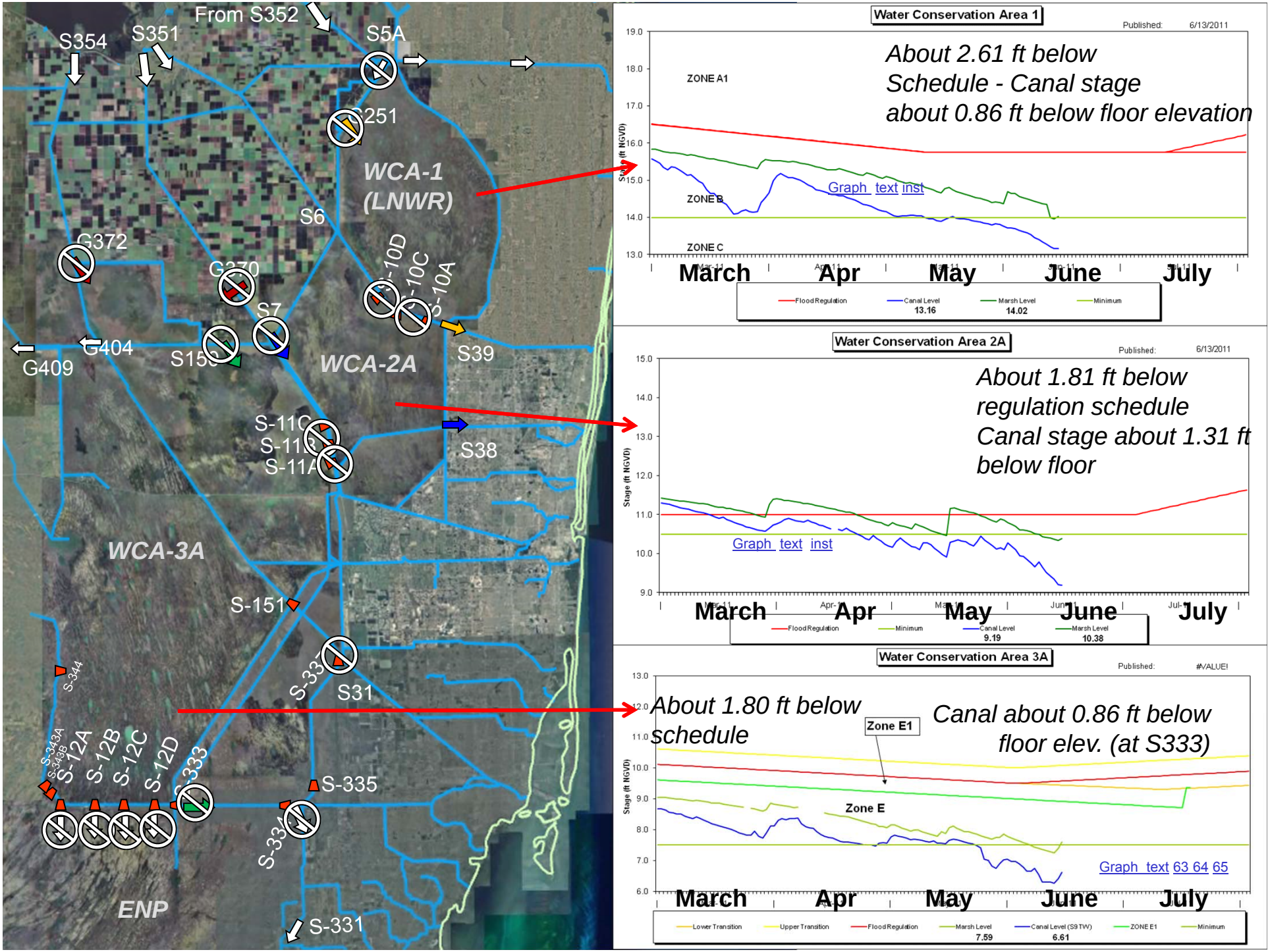

From S352
S354
S351
S5A
S251
WCA-1
(LNWR)
S6
G372
G370
S7
S-10D
S-10C
S-10A
G404
G409
S150
WCA-2A
S39
S-11C
S-11B
S-11A
S38
WCA-3A
S-151
S-344
S-333
S31
S-343A
S-343B
S-12A
S-12B
S-12C
S-12D
S-333
S-335
S-334
ENP
S-331
Water Conservation Area 1
Published: 6/13/2011
ZONE A1
ZONE B
ZONE C
About 2.61 ft below
Schedule - Canal stage
about 0.86 ft below floor elevation
Graph text inst
Stage (ft NGVD)
March
Apr
May
June
July
Flood Regulation
Canal Level
13.16
Marsh Level
14.02
Minimum
Water Conservation Area 2A
Published: 6/13/2011
About 1.81 ft below
regulation schedule
Canal stage about 1.31 ft
below floor
Graph text inst
Flood Regulation
Minimum
Canal Level
9.19
Marsh Level
10.38
Water Conservation Area 3A
Published: #VALUE!
About 1.80 ft below
schedule
Canal about 0.86 ft below
floor elev. (at S333)
Zone E1
Zone E
Graph text 63 64 65
Lower Transition
Upper Transition
Flood Regulation
Marsh Level
7.59
Canal Level (S9TW)
6.61
ZONE E1
Minimum

Lake Okeechobee Water Level Comparison

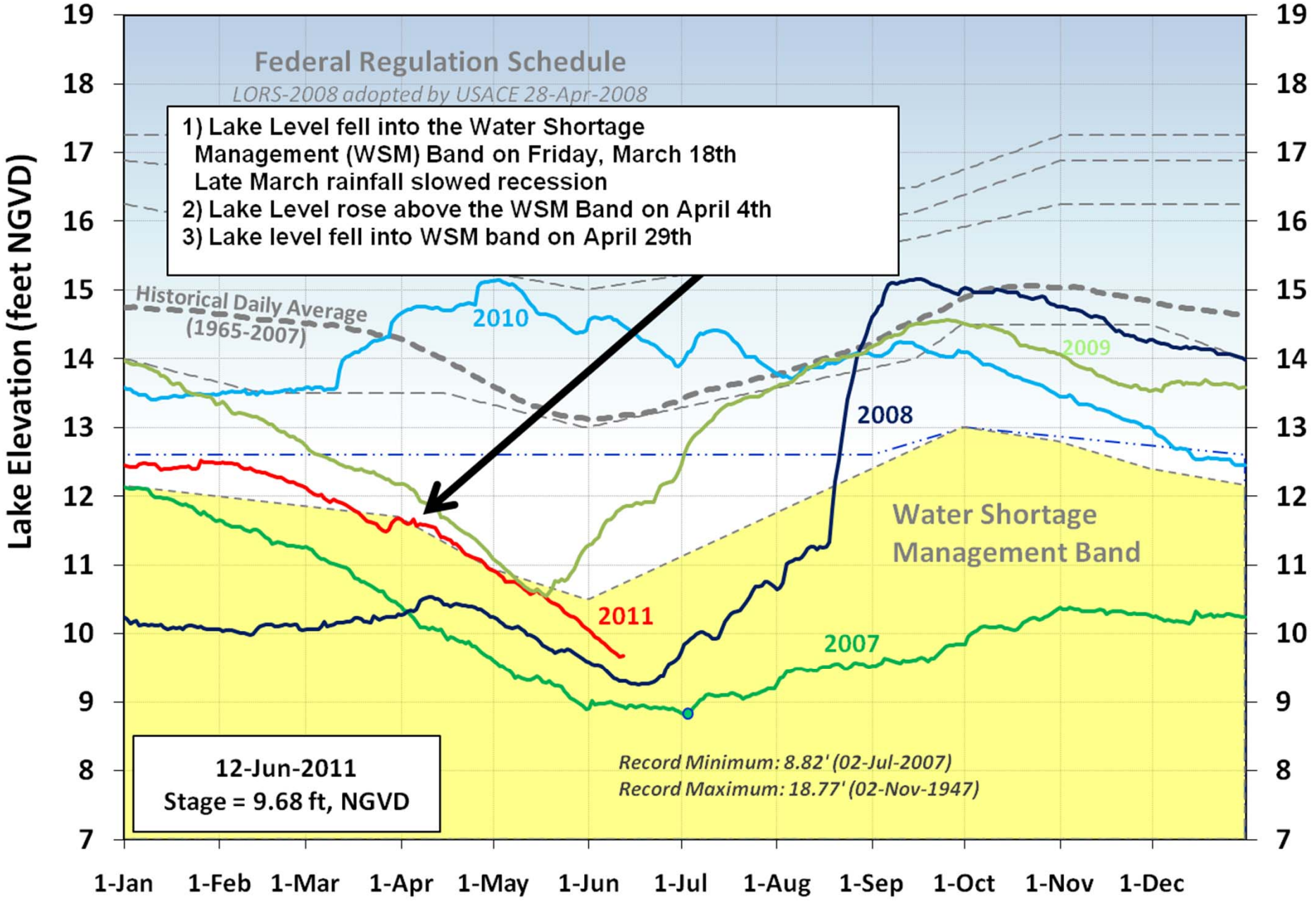


Fig. 1 Baseline Chloride Concentrations Prior to Pumping from L-8 Reservoir (6/22/11)

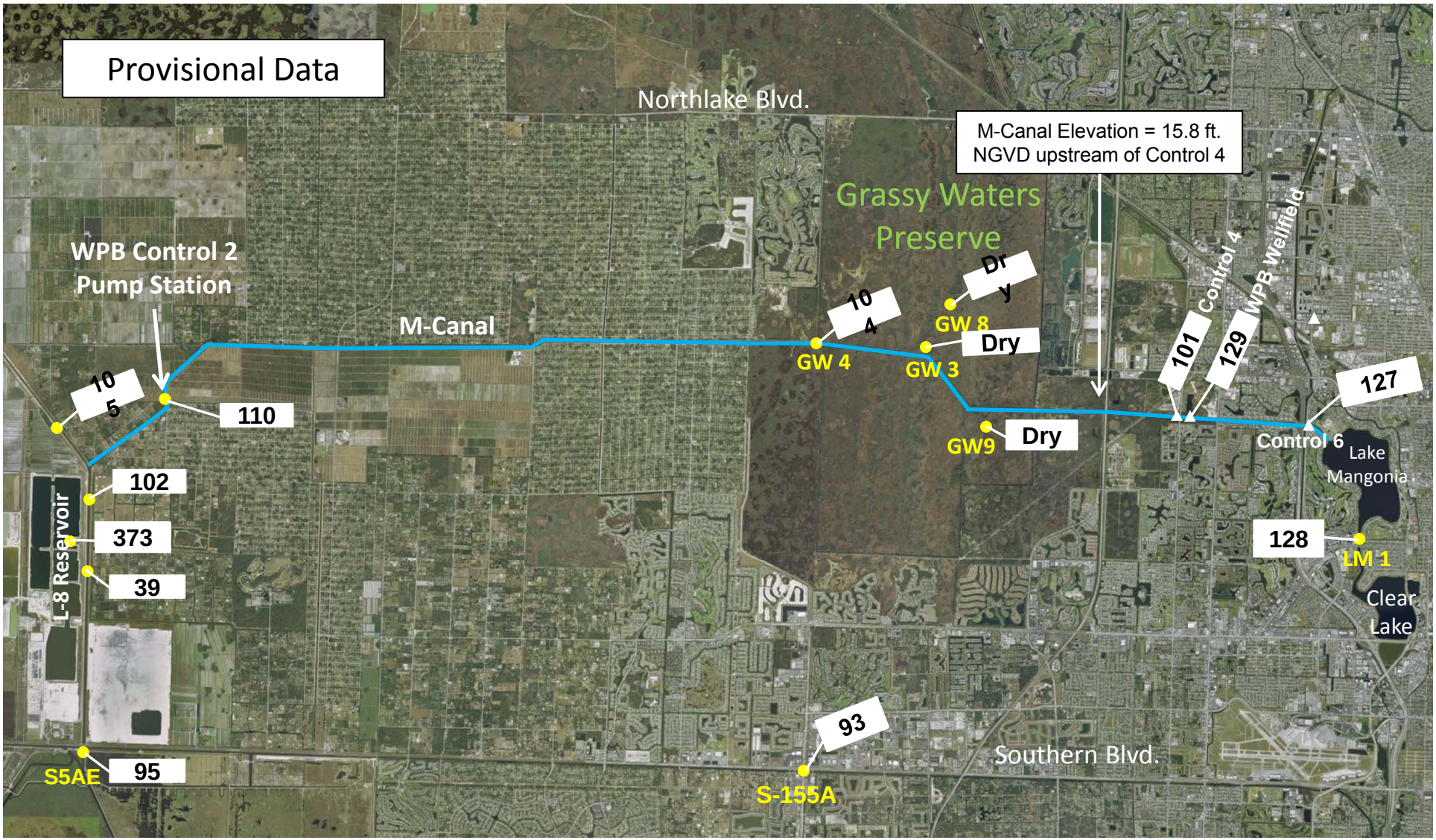
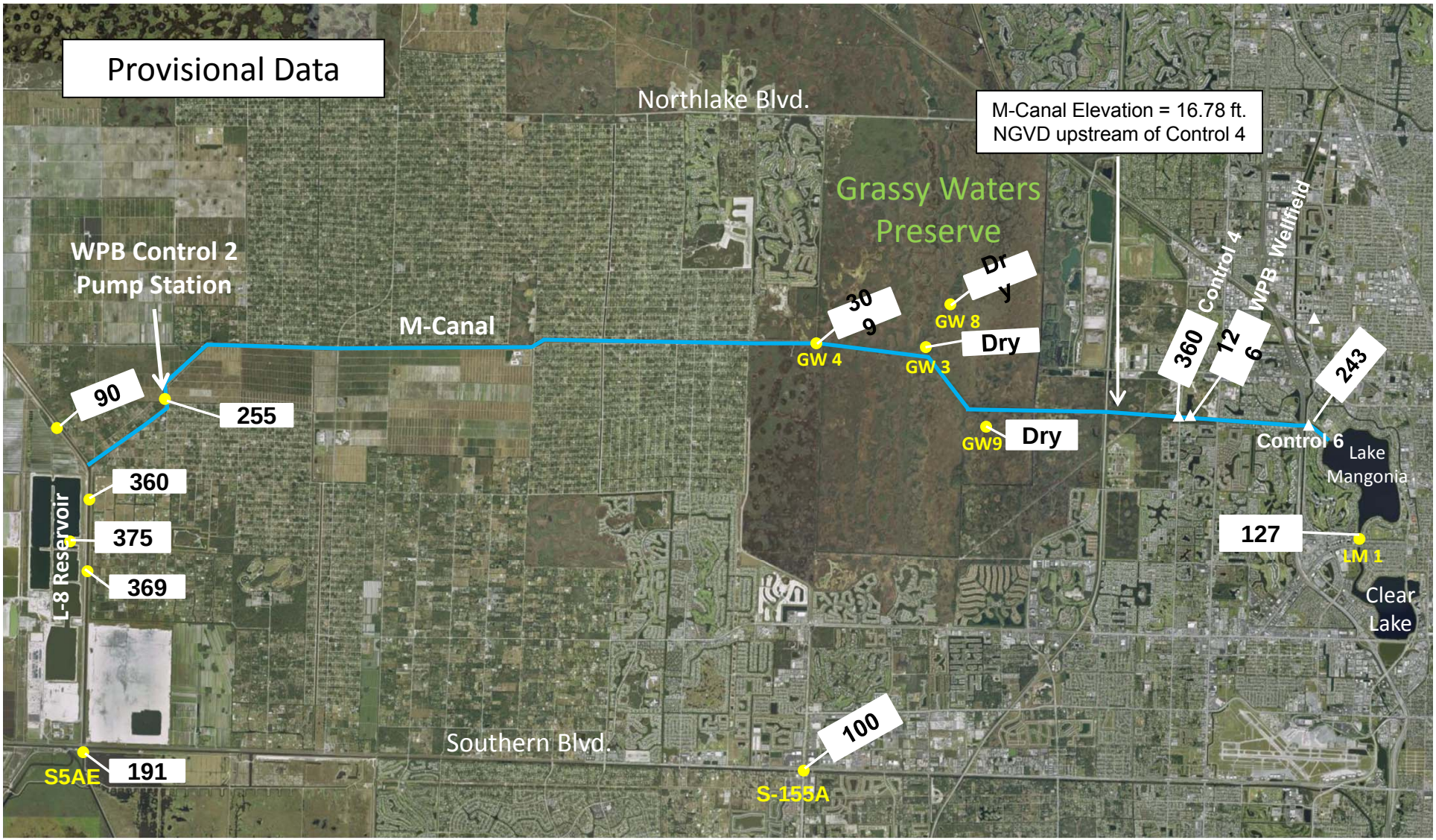
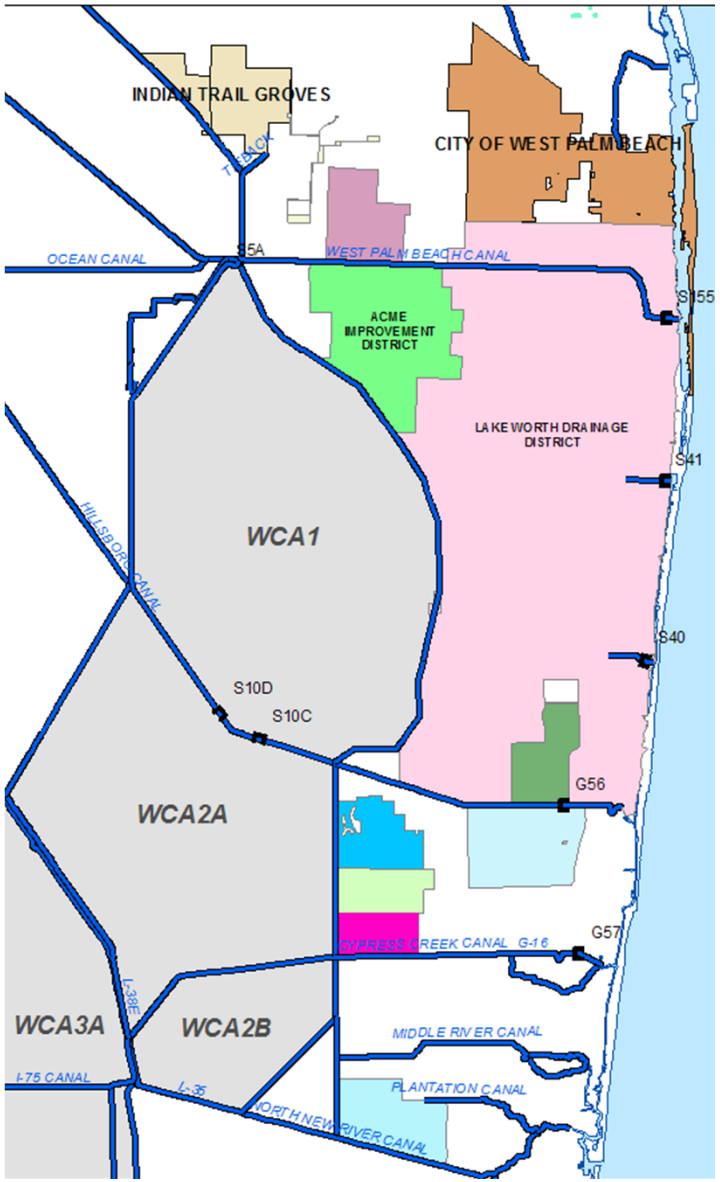


Fig. 2 Chloride Concentrations After 6 Days of Pumping (6/29/11)



Capturing Stormwater for Recharge

- Even in drought, heavy rainfall can exceed regional canal capacity
- Moved water into local storage to minimize discharges to tide

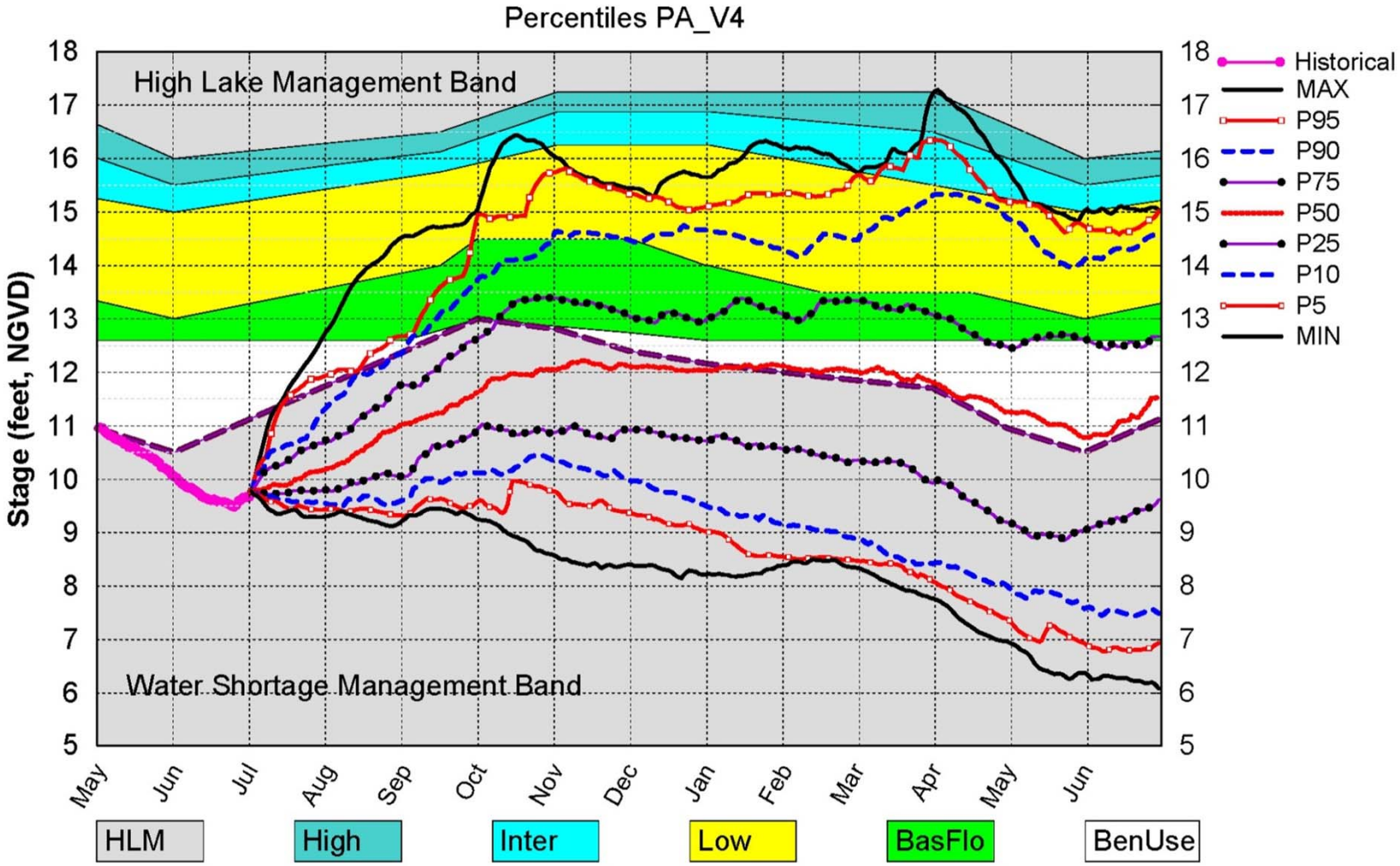


July 2011

Situation

- Lake O -- Minimum Flow and Level exceeded (<11 ft NGVD for > 80 days)
- Caloosahatchee Estuary – MFL exceeded (10 psu salinity) – improving now
- STAs stayed hydrated (except STA 3 and 4)
- No saltwater intrusion impacts to wellfields
- Impacts to agriculture minimized through use of Lake O temporary forward pumps but crop loss significant due to freezes and drought
- Water deliveries to City of WPB from L8 Reservoir
- Economic impacts to golf courses, nurseries minimized

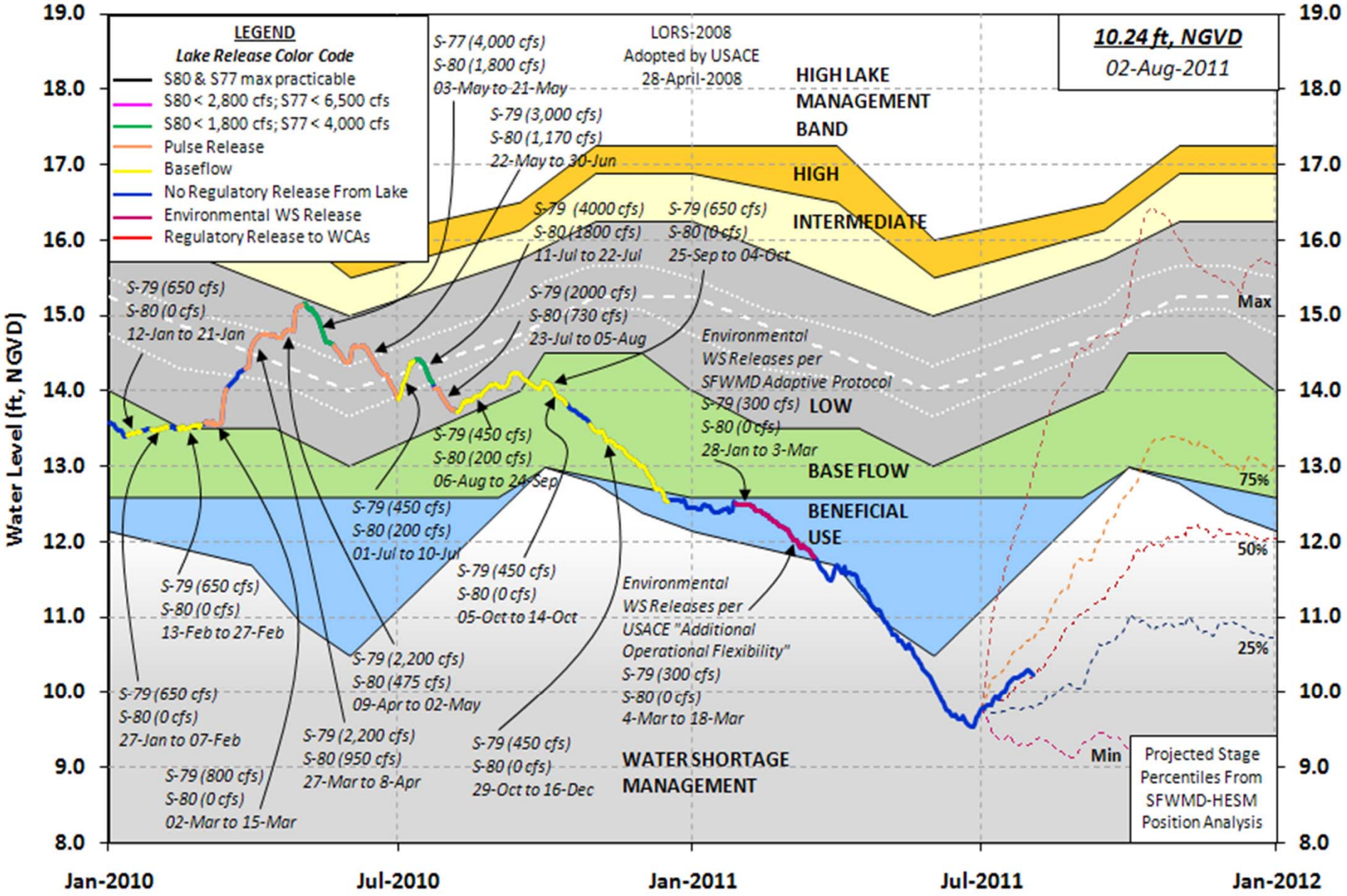
Lake Okeechobee SFWMM July 2011 Position Analysis



(See assumptions on the Position Analysis Results website)

Thu Jul 7 13:33:01 2011

Lake Okeechobee Water Level History and Projected Stages



Questions