WRTF Presentation Agenda

- Water Budget 101
- Lake Okeechobee Update
- Status of C-101W and C-18 Reservoir

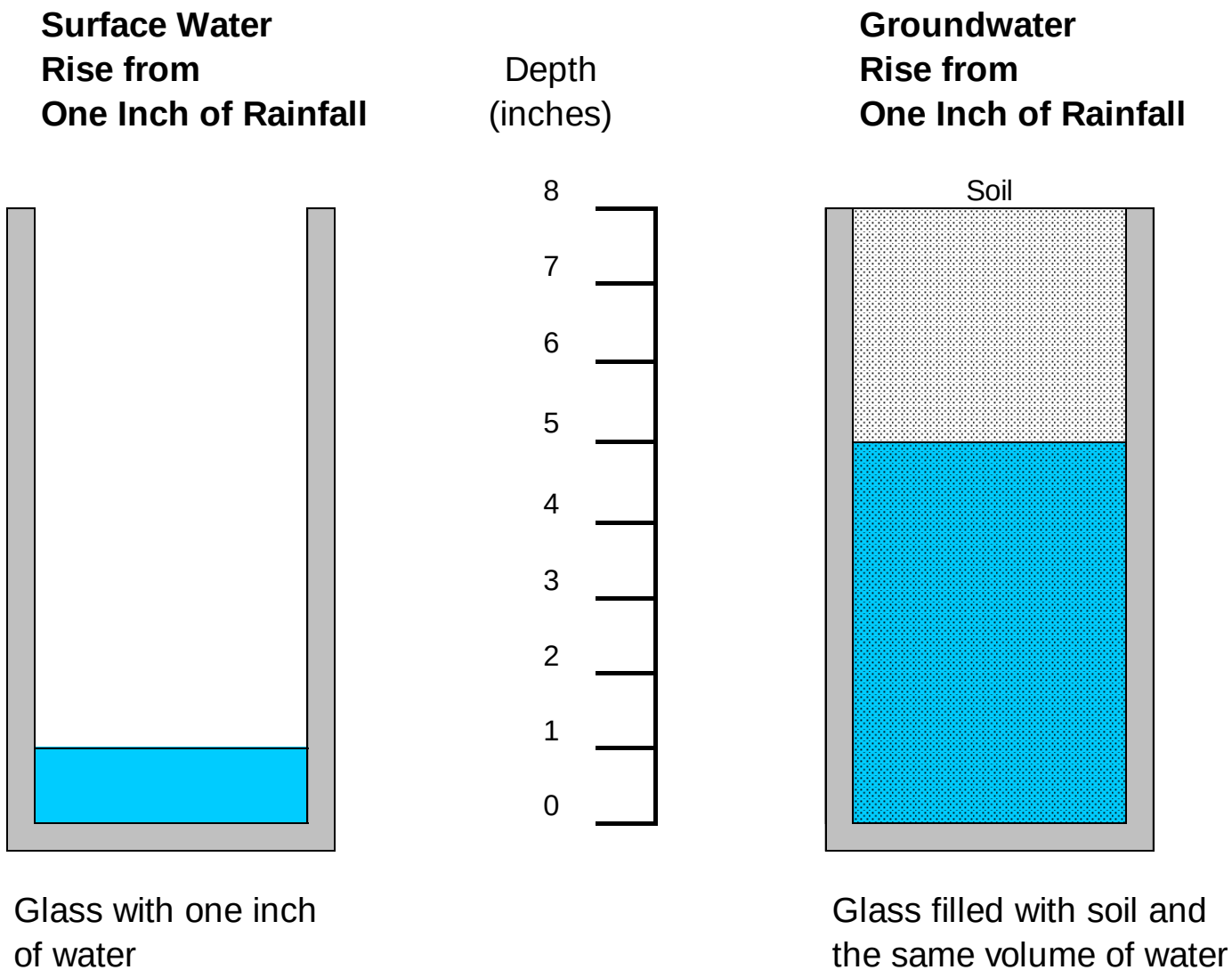
Water Budget 101(WB-101) (how water budget are like and unlike financial budgets)

- Storage is like a bank account, but more limited as water never earns interest.
- Rainfall is like income
- Evaporation is like fixed expenses.
- Seepage is like reducible expenses

WB-101 Storage

There are two locations for storage the first is as surface water (lakes and reservoirs) the second is groundwater.

Groundwater storage is limited to void space available in the aquifer



The surface water rises one inch for a one inch rainfall event.
Just like an empty glass of water.

Groundwater rises considerably more due to the lack of open spaces to store the water. For a void space of 20 percent one inch of rainfall results in a groundwater rise of 5 inches

WB-101 Storage and Use

Both Surface Water (SW) and Groundwater (GW) storage lose water due to evapotranspiration (ET) and seepage.

Water storage is like a bank account in that water can be stored. It differs in that water requires large spaces to store meaningful volumes of water and it never earns interest.

For example a household using 300 gpd will use about 110,000 gallons per year. This equates to about 6 large pools or one acre filled to 1/3 feet or one acre of groundwater 1.5 feet deep.

1 acre-feet = 325,829 gallons

WB-101 Use Example

For eastern PBC there is considerable seepage to tide from the Surficial Aquifer System.

Water level must be maintained by canal recharge to compensate for ET, wellfield withdrawals, and seepage to tidesusing the canal.

WB-101 Runoff & Accretion

Accretion is the recharge of the surficial aquifer when rainfall exceed ET enough to allow net infiltration.

Runoff occurs when either the rainfall rate exceeds the ability of the surface soils to infiltrate the rainfall or the water table rises to ground surface.

For most of south Florida the infiltration rate of the sandy soils is able to keep up with rainfall rates

WB-101 Runoff Factors

For most of south Florida the infiltration rate of the sandy soils is able to keep up with rainfall rates with the exceptions being:

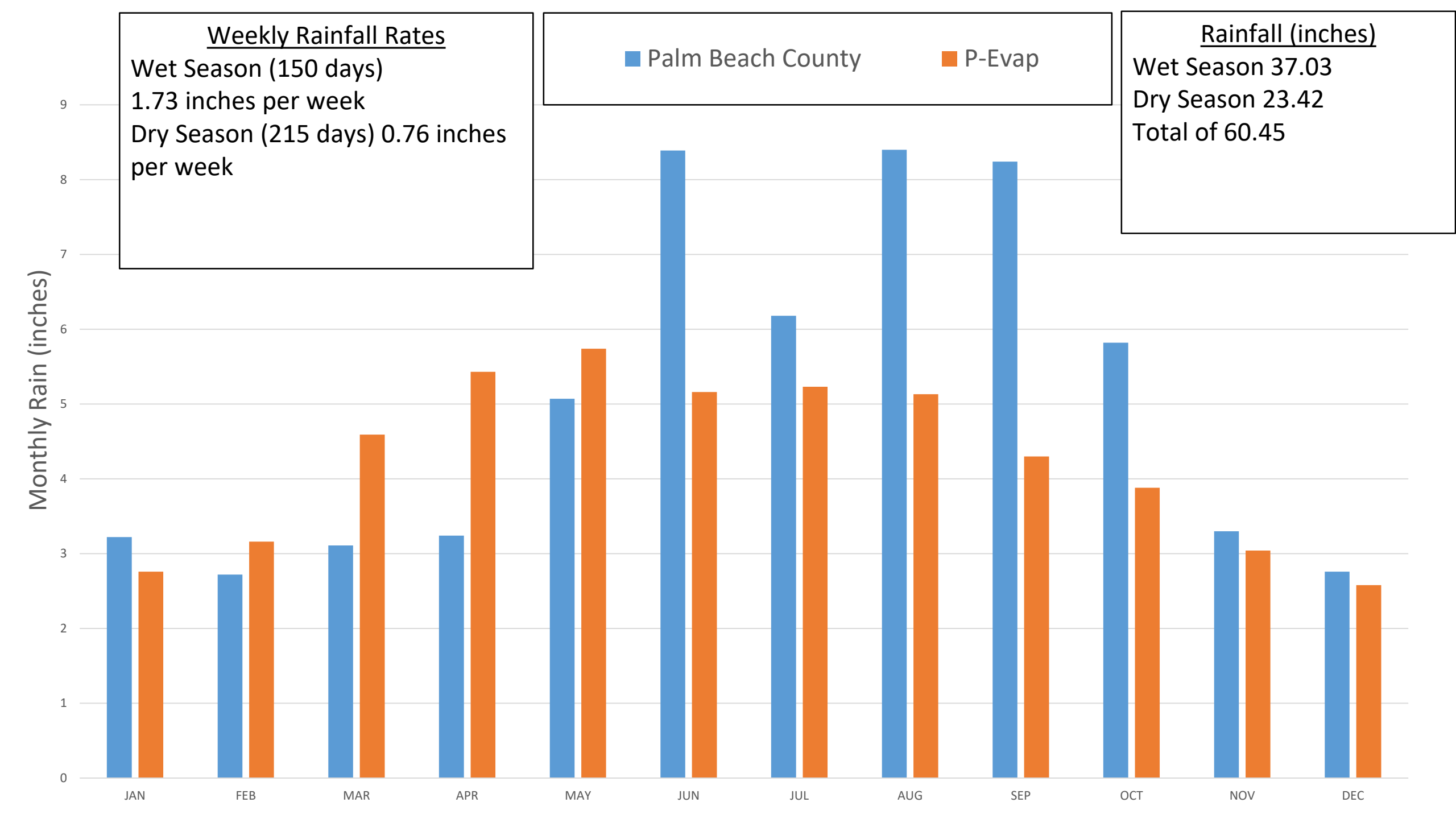
- Areas with high slopes.
- Impervious areas such as roads, drive ways, and roofs.
- Areas receiving runoff from impervious areas
- When exceptional rainfall exceeds infiltration rates.

WB-101 Factors Affecting Runoff

The relationship between runoff, available soils storage, available surface storage, ET, and seepage can result in surprising changes in the amount of runoff for relatively small changes in rainfall.

If you think about runoff as profit then rain is income and ET is fixed costs. For month where rainfall only exceed ET slightly it takes time for the groundwater and surface storage to fill up and runoff to occur.

The following figure shows typical rainfall an ET.


Weekly Rainfall Rates
Wet Season (150 days)
1.73 inches per week
Dry Season (215 days) 0.76 inches per week
Palm Beach County
P-Evap
Rainfall (inches)
Wet Season 37.03
Dry Season 23.42
Total of 60.45
Monthly Rain (inches)
0
1
2
3
4
5
6
7
8
9
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC

WB-101 – Wet Season Runoff

Runoff occurs when rainfall exceeds ET enough to fill both GW and SW (e.g. lakes, wetlands, and surface storage).

For a July example assuming that rainfall in late June filled the GW and SW storage.

- For average rainfall of 6 inches and ET of 5 inches the rainfall (income) exceed ET (cost) by 1 inch (17%).
- For a 1 inch increase in rainfall (17%) the runoff increases from 1 to 2 inches (100% increase).
- For a 1 inch decrease in rainfall (17%) the runoff decreases from 1 to 0 inches (100% decrease).

WB-101 – Recovery Rates

Most agricultural areas in PBC have drainage rates ranging from 0.75 to 1.5 inches per day.

Most residential areas range from 0.75 to 3.0 inches

These are the peak rates. For system drained by gravity the rates reduce considerably from the peak as water recedes.

This means that that for areas with one inch per day of drainage it takes four days of no rain to recover from a four inch event and about seven days with average rainfall.

WB-101 – Event Runoff

For an example assuming an average water table depth of 2 feet providing about 4 inches of soil storage:

- For a rainfall event of 6 inches there would be runoff on the order of 2 inches.
- For a rainfall event of 8 inches there would be runoff on the order of 4 inches which is twice the runoff for a 30% increase in rainfall.
- For a rainfall event of 12 inches there would be runoff on the order of 8 inches which is four times the rainfall increase.

WB-101 – Storage Durations

From a water management perspective season storage is storage that carries over water from a wet season to a portion of the dry season. Long term storage needs to be able to effectively store water for at least two years. Over the duration of a two year drought ET can exceed direct rainfall on a reservoir by 4 feet correspondingly:

- A six feet deep reservoir with no inflows would only have 2 feet of available water (33%).
- A ten feet deep reservoir with no inflows would have 6 feet of available water (60%).

Discussion