LOXAHATCHEE RIVER WATERSHED RESTORATION PROJECT

Project Delivery Team

SMART Planning Kickoff Meeting

March 30, 2016

Federally designated as a National Wild and Scenic River, the Loxahatchee River and its watershed are homes to 33 federally threatened and endangered species, 20 federally protected migratory bird species, and 30 additional State's species of concern

Trusted Partners Delivering Value, Today and Tomorrow

U.S.ARMY

US Army Corps of Engineers

BUILDING STRONG®


One of the Last Old Growth Cypress Floodplains in the SE Florida


Last Large Freshwater Wetland Corridor in Project Area


Vulnerable estuarine habitats

1. Introductions / Opening Remarks

Dr Orlando Ramos (USACE) & Beth Kacvinsky (SFWMD)

1. Name
2. Government organization/agency or Public

FACA Exception Guidance

- CERP Team members include only the federal officials and elected officials –or designated employees with authority to act on their behalf- of the State, local, and tribal governments
- State, local, or tribal elected official are represented by agency employees and may designate –in writing- a representative other than employee
- PDT is not an advisory or decision-making body subject to FACA requirements
- Public comments are welcomed and are input –not responded- to the team for consideration not discussion

2. Quick Review of SMART Planning Process and Deliverables for Milestone 1

Dr Brad Foster (USACE)

MG Walsh Memo (3x3x3)

BUILDING STRONG

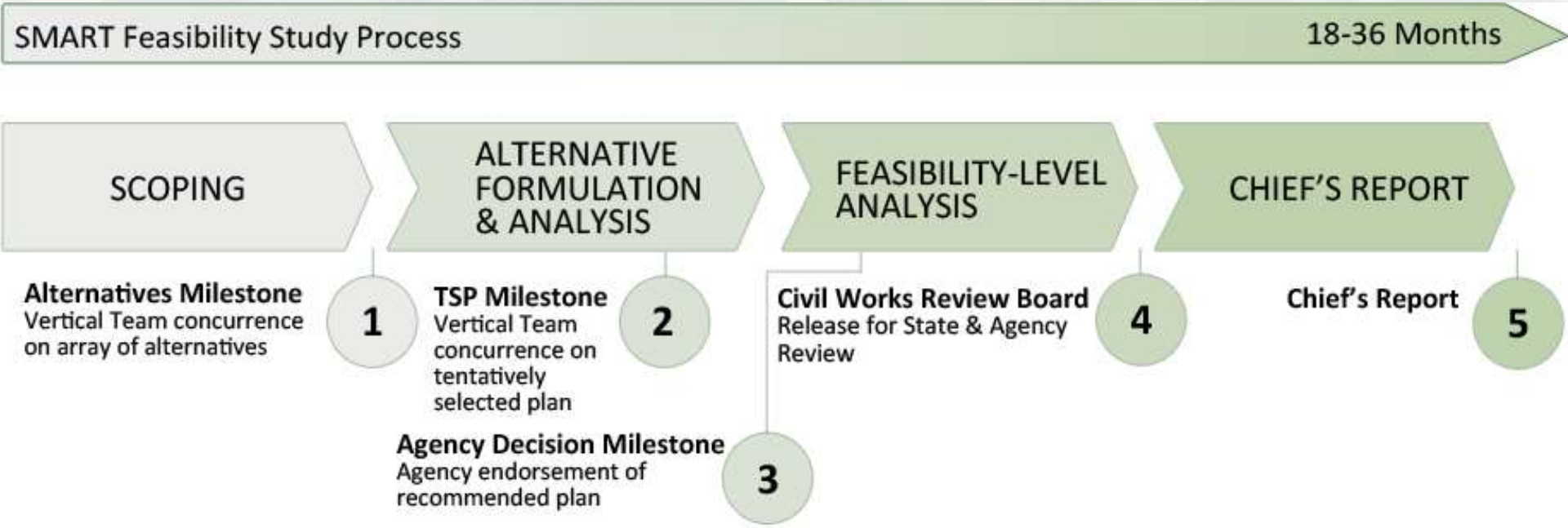
- Effective 8 Feb 2012
- Applies to all planning studies
- Introduces aggressive approach to improve feasibility study program management, performance, execution & delivery
- Holds all Civil Works functional elements responsible & accountable

3x3x3 Rule:

- ❑ $3 million
- ❑ 3 years
- ❑ 3 levels of enhanced vertical teaming
- ❑ 100 page main reports (w/ appendices 3” binder)
- ❑ Exemptions are few and far between

Decision Milestones

BUILDING STRONG



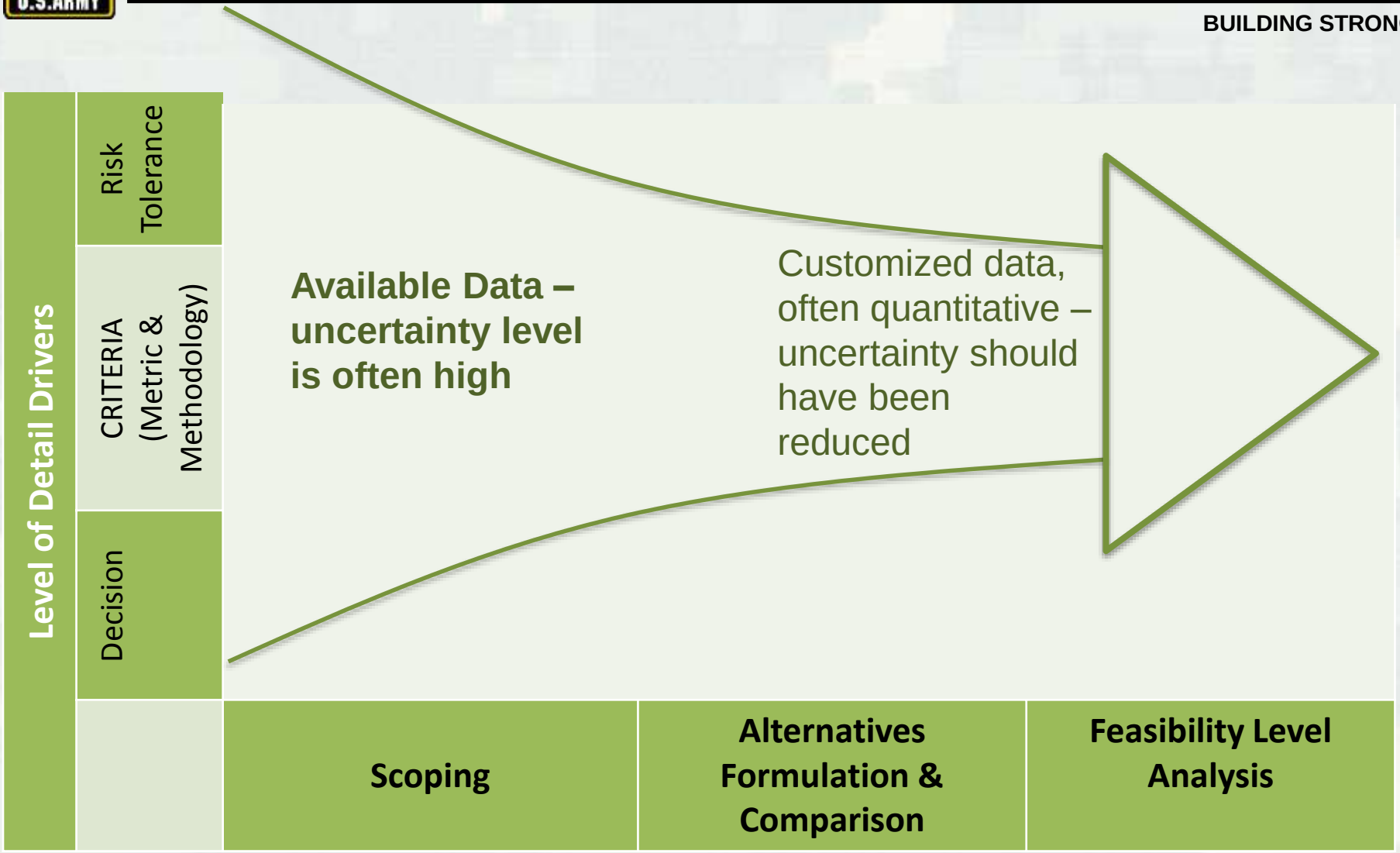
Focus Shifts Through the Process

Focus on alternatives evaluation to identify a tentative plan for more detailed design

Focus on scaling the measures and features for the recommended plan/LPP

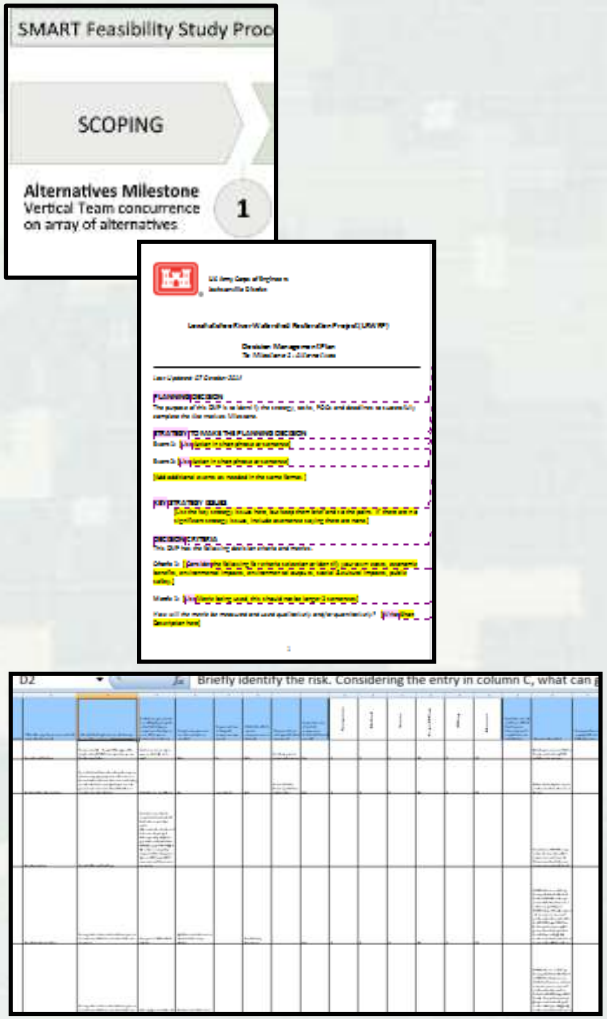
The Right Level of Detail at the Right Time

BUILDING STRONG



Deliverables for Alternatives Milestone

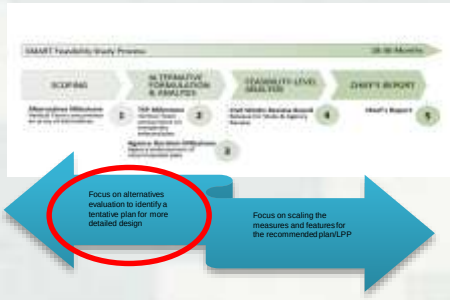
BUILDING STRONG



- ✓ **3x3x3 Compliance Memo**
  - Updated Project Management Plan
  - Budget and Schedule tables
  - Risk Register (RR)
  - Report Synopsis
- **Existing Conditions and Future Without Assumptions**
- **Focused Array of Alternatives**
- **Criteria to evaluate/compare alternatives**
- **Milestone 1 meeting with USACE HQ – April 2016**

Formulate Alternatives

- Identify plans that are “Significantly Differentiated”
- If sponsor or others have a preferred alternative, what are some distinctly different approaches to meeting the objectives?
- Focus on different mixes of measures in different locations instead of focusing on incremental scales of same measures
- Identify how data can be used to characterize differences in costs, benefits, impacts
- Screen the array before the Alternatives Milestone
- Able to refine after the Alternatives Milestone



3. Existing and Future Without Base Conditions For Modeling

Laura Kuebler (SFWMD) / Beth Kacvinsky (SFWMD)

Base Modeling Assumptions

BUILDING STRONG

- 2014 Base Existing Condition (2014B)
- 2070 Future Without Project Condition (2070B)
- Applying LECSR-NP: Northern Palm Beach County Version of the Lower East Coast Subregional MODFLOW Model
  - Active model boundary covers entire LRWRP area
  - Calibrated through 2014

Regional System

BUILDING STRONG

- LECSR-NP does not simulate regional water management and relies on the SFWMM for boundary conditions into the LRWRP area
  - L-8, C-51 and C-44 Canal stages
  - Flows from Lake Okeechobee to the M-Canal
  - No SFWMM boundary conditions required for C-18 and other internal watersheds
- IMC recommended SFWMM runs from Central Everglades Planning Project (CEPP) Study
- Regional and subregional models cover 41-year period of simulation from 1965 to 2005

Storage Facilities

- Storage facilities are not operable and do not provide water deliveries to the LRWRP project
  - C-18W Impoundment
  - L-8 Flow Equalization Basin (L8FEB)
  - C-51 Reservoir
- Aquifer Storage and Recovery (ASR) is not implemented

WPB Water Catchment Area

- M-Canal Conveyance Improvements
  - West Palm Beach Control #2 pump station has a pumping capacity of 165 cfs
  - New pump station (up to 300 cfs) is not simulated until ‘with project’ conditions
- GWP is maintained higher to represent current operational protocols based on 2013 water use permit
- Improvements to pass 100 cfs at Northlake bridge, draining north at 19.0 ft NGVD

Loxahatchee Slough Area

BUILDING STRONG

- New bridge constructed on Beeline with no flow restrictions
- G-161 constructed but not operational
- G-160 constructed but not operational

C-18, G-92 and Lainhart Dam

BUILDING STRONG

Western C-18 Weir exists and remains unchanged.

C-18 canal operations follow:

- The minimum flow delivered to the NW Fork is 35 cfs as currently operated. If flows at the Lainhart Dam fall below 35 cfs, up to 50 cfs is sent through G-92 to try and maintain 35 cfs at Lainhart Dam if water is available.
- G-92 discharges to the NW Fork of the Loxahatchee River when C-18 is above 13.0 ft. NGVD
- When C-18 exceeds 14.5 ft. NGVD, up to 400 cfs is sent north over G-92
- If C-18 is between 13.0 and 14.5 ft. NGVD and Lainhart Dam flows exceed 50 cfs from Jupiter Farms runoff, then G-92 flow is zero.
- If C-18 exceeds 15.0 ft. NGVD, S-46 opens and discharges up to 4,000 cfs to the SW Fork of Loxahatchee River

C-18 Weir simulated with weir crest elevation of 17.6 ft NGVD.

C-18 canal modeled operations follow:

- Up to 200 cfs discharges north to C-14 Canal as historically operated.
  - G-92 is closed when C-18 headwater is below 13.0 ft.
  - G-92 discharges to the Loxahatchee River when C-18 headwater is between 13.0 ft. and 14.5 ft.
  - If C-18 headwater exceeds 15.0 ft, S-46 opens and discharges up to 4000 cfs.
  - Riverbend Culverts A, B and K located between G-92 and S-46 are not modeled.

SIRWCD and Jupiter Farms

BUILDING STRONG

- Jupiter Farms canals are maintained at 13.0-14.0 ft NGVD draining to C-14
- Reverse flow through G-92 modeled
  - When C-14 exceeds 13.5 ft NGVD and S-46 headwater stage is less than 13.5 ft NGVD

Loxahatchee Tributaries

- Kitching Creek, Wilson Creek and the North Fork are unregulated
- Hobe Grove Ditch, Cypress Creek and Loxahatchee Slough are regulated based upon existing controls

Martin County Properties

BUILDING STRONG

- Hobe St. Lucie Conservancy District (HSLCD) has three discharge structures.
  - One discharges to the South Fork of the St. Lucie River; the other two discharge to Cypress Creek and the Gulfstream Canal to the Loxahatchee River.
- HSLCD is regulated based upon existing controls
  - South Fork Structure at 2 ft NGVD
  - Cypress Creek Structure at 2 ft NGVD
  - Gulfstream Canal Structure at 2 ft NGVD

Martin County Properties

BUILDING STRONG

Nine Gems (Palmar East) Properties	Existing drainage is assumed for southern Nine Gems Canal and lateral drainage canals, as well as for HSLCD drainage canal.
Gulfstream Property (~961 acre Citrus Groves Adjacent to and west of I-95/Turnpike)	Existing drainage is assumed at Cypress Creek Canal.
Culpepper Property Improvements	Existing fixed crested weir twin 84" culverts at 16.1 ft NAVD and southern Culpepper culverts (WCS-2, WCS-3 and Jupiter Grade Structure). Existing berm elevation of 21 ft NAVD west of Ranch Colony is assumed. Southern Nine Gems Canal and berm exist separating Nine Gems from Culpepper.
Cypress Creek and Shiloh Farms Property	2 66” RCP culverts with risers exist at Gulfstream Road .
Moonshine Creek and Eastern Gulfstream Property	Hobe Grove Ditch is regulated based upon existing control.
Kitching Creek – This site is an existing upland vegetation site.	Exists as upland vegetation site in land use.

Indian Trail Improvement District (ITID) M-1 Basin

ITID has approximately 274 cfs of flood protection (peak) to the L-8 Canal which is equivalent to one-fourth inch flood protection. Most discharges occur via the M1 Canal to C-51 unless C-51 stages restrict such flows as specified in ITID's permit.	Maximum emergency conditions discharge from ITID is limited to 274 cfs. ITID can discharge over 1800 cfs when not restricted. Off peak flows to the M1 Canal are not modeled directly.
ITID's emergency discharge is to L-8 with subsequent discharges to the S-5 complex and Lake Okeechobee at C-10A as conditions allow.	ITID's emergency discharges are typically sent to the S-5 complex and then to tide (which is outside the model domain). ITID's typical discharges are typically sent to the C-51 Canal and then to tide.
ITID Impoundment is not operated as an STA.	This temporary holding facility is treated as a pass-through facility (i.e., does not store water long term).
Use existing operations for ITID M1 Upper and Lower Basin pumps	M1 Upper Basin control elevations are 17.0 ft NGVD in the dry season (Jan-Apr and Nov-Dec) and 16.0 ft NGVD in the wet season (May-Oct). M1 Lower Basin control elevations are 17.0 ft NGVD in the dry season (Jan-Apr and Nov-Dec) and 15.0 ft NGVD in the wet season (May-Oct).

Other Related Structures

- S-155A is constructed and operational. Portion of L-8 discharges to S-155A and out S-155 to Lake Worth Lagoon. All C-51 eastern basin water discharges out S-155.
  - S-155 flows are approximated using LECSR-NP and SFWMM results for S155 and L-8 Basin water budget.
- STA-1 East and STA-1 West are constructed and operational.
  - All discharges to the STAs are defined in the SFWMM water budget. No operational changes were made as part of the LECR-NP modeling.

Water Use

- 2014 Base Existing Condition (2014B)
  - Public Water Supply (PWS) withdrawals are average annual historical pumpages for the year 2014
- 2070 Future Without Project Condition (2070B)
  - PWS projections are derived from the LEC WSP 2030 projections and the Upper East Coast WSP 2040 projections
- Irrigation withdrawals are based on permitted demands

Water Restrictions

- Coastal well triggers are used to simulate water shortages when the potential for salt water intrusion exists.
- Additional imposed phase 1 restrictions for Lake Okeechobee are based on the regional model conditions from SFWMM CEPP simulations

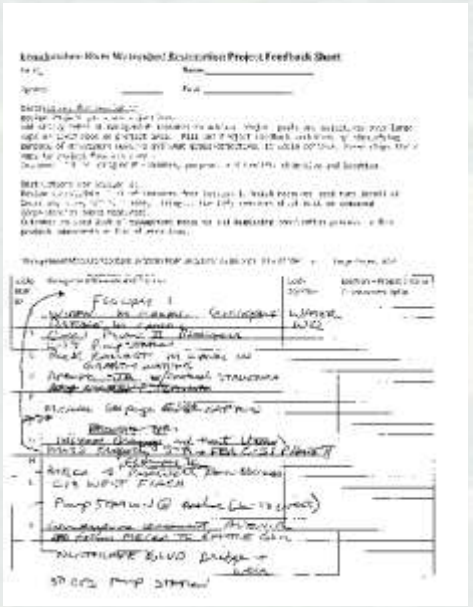
4. Initial Screening of Options, Including Flow Volume and Timing

Dr Brad Foster (USACE) / Scott Thourot (SFWMD)

Screening of Measures

BUILDING STRONG

- NPBC-1 analysis and prior PDT meetings to identify measures and preliminary alternatives



- List measures, then screen yes/no
  - Does it address objectives
  - Acceptable
  - No significant adverse environmental impacts
  - Cost prohibitive
- Screened out: flow through golf course, storage facility in Moss, storage east of GWP

Combine Management Measures

- Combine management measures into groups (components) considering
  - Dependency, where one measure requires that another also be implemented
  - Mutual exclusions, where one measure prevents certain other measures from being implemented
  - Redundancy, beyond the needs for safety & reliability
- Combine Components into Options for each flowway, based in part on
  - General locations for storage & source of water (FW1,FW2)
  - Reducing major over-drainage (FW3)

Example Options Table

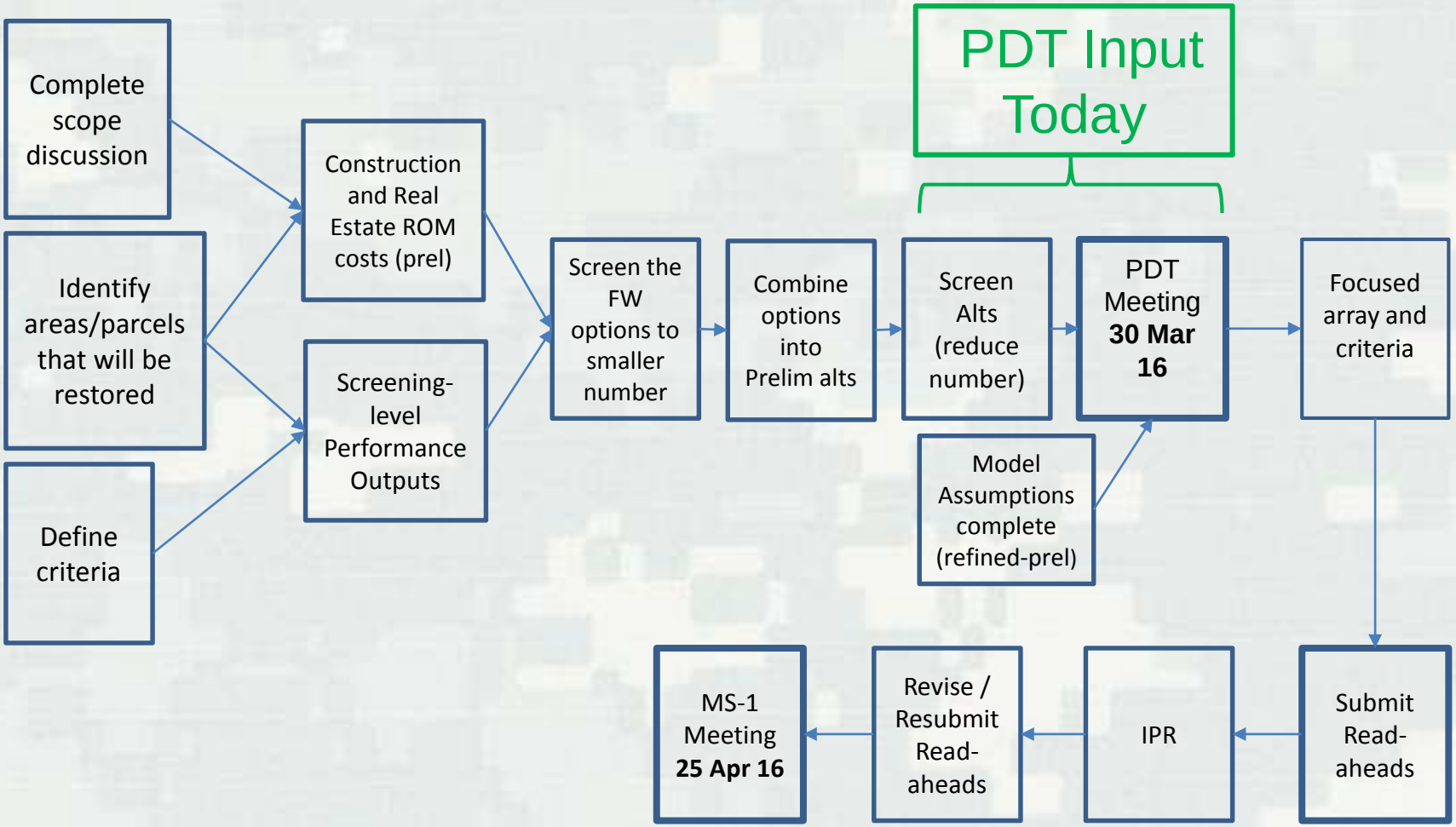
BUILDING STRONG

Measures	Description/purpose/estimated benefit	2-A	2-B	2-C	2-D	2-E	2-F	2-G	2-H
C-18 W storage reservoir	above ground reservoir, inflow pump, discharge structure, seepage ctrl	x	x	x	x	x	x	x	x
	several volumes								
	several volumes								
ASR at C-18 W storage	several numbers of wells, supplement volume of the reservoir		x			x	x	x	x
	several numbers of wells, supplement volume of the reservoir								
Relocate C-18 weir	to west side of Beeline, w/o backpump			x		x		x	
	to west side of Beeline, w/ backpump								
Connect M-O to Mecca	by canal, uses pump				x		x	x	x
	by flowway, uses pump								
Natural storage on Mecca	Restore natural topography, culverts under Beeline, bridge for Beeline, backfill interior canals in Corbett, pump to protect Caloosa (2.7a, 2.8a, 2.9a)								x
Lucky Tract seepage barrier	To keep Lucky water from seeping to C18W								x
Structure in C-18 W	Near confluence if C-18 canal, to increase stage in canal and improve Lucky Tract and Lox Slough							x	

This example table is for FW2. There were similar tables for FW1 and FW3.

Steps to Screen Options and Assemble Preliminary Alternatives

BUILDING STRONG



Screen the Options

- Screening criteria
  - Volume and timing to Lainhart Dam, FW1 & FW2
  - Timing of discharge to NW fork, FW3
  - Natural storage area
  - Connectivity (ecological)
  - Flexibility
  - Robustness
  - Compatibility
  - Nearness to NW Fork
  - Cultural Resources
- Assign scores, add the scores, consider prelim cost

Options Removed

- Options that contained these components were screened
  - Large number of ASR wells at C-18W, site constraints
  - Back-pumping west to the C-18W reservoir, not effective
  - Major widening of the M-Canal, too costly
  - Scraping within GWP, limited benefit for the cost

Options Retained

BUILDING STRONG

- FW1: both contain G-160, G-161, GWP Triangle
  - Shallow storage in L-8 Basin
  - Deliver ITID water to M-Canal
- FW2
  - C-18W storage reservoir, with or without ASR
  - Natural storage on Mecca with surface flow to Lox slough
- FW3
  - Small: Kitching Cr, Moonshine Cr, Gulfstream East & Cypress Cr Canal
  - Large: add Gulfstream West, Nine Gems, Culpepper
- Combination FW1 & FW2: C-51 Phase 2, conveyance to both flowways, C-18W reservoir, pipe around GWP

5. Initial Alternative Plans

Dr Brad Foster (USACE)

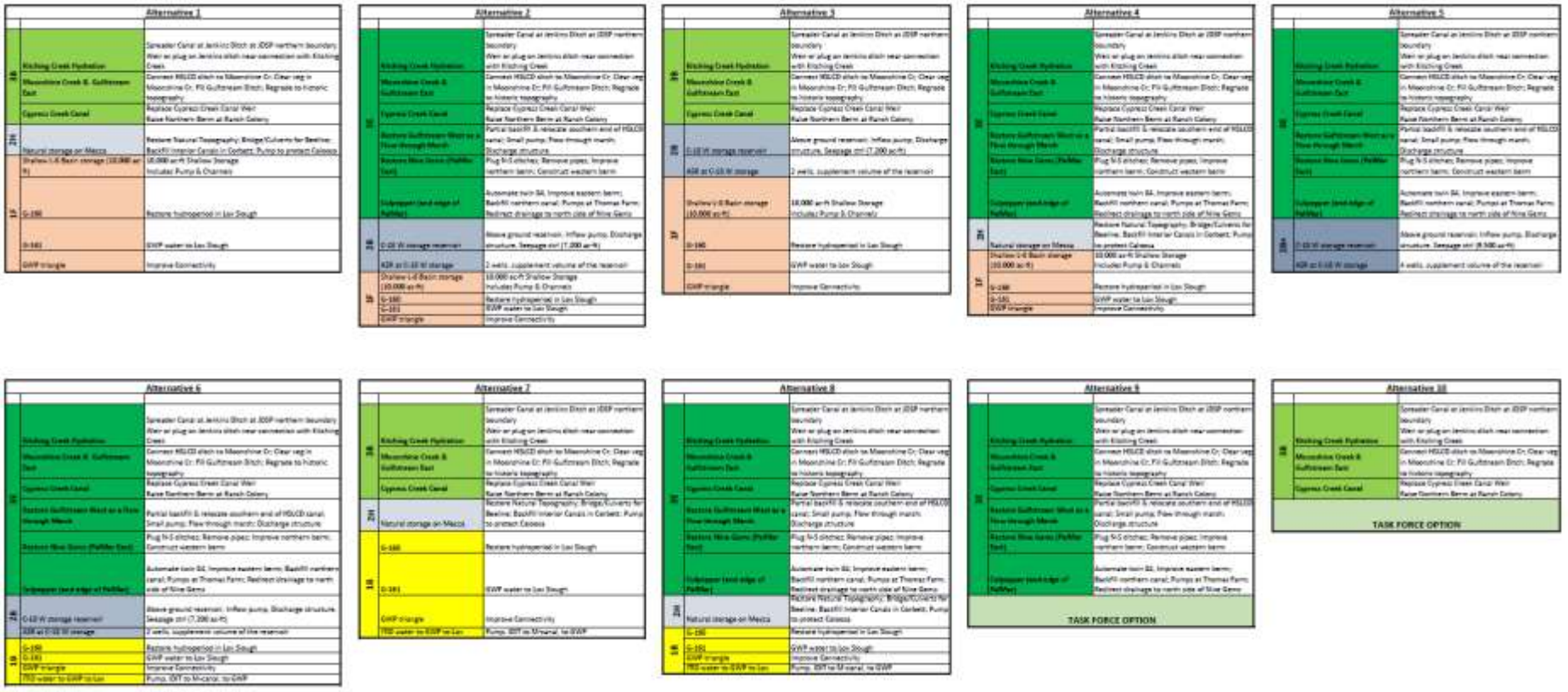
Development of Initial Alternatives

- The Plan Formulation subteam combined the retained Options into complete Project Alternatives
  - Generally, one option per flowway
  - How the options would work together
  - Match volumes of storage so the total would be able to meet targets at Lainhart Dam
  - Alternatives received during earlier PDT meetings and recent Plan Formulation subteam meetings
  - Include some distinctly different alternatives

Initial Alternatives

BUILDING STRONG

- All alternatives on one page (see read-ahead)
- Brief list of measures by Flowway Option



Initial Alternatives

- Read-ahead / handout
- One page per alternative to describe locations and details of features

6. Breakout Session - Identification of Flexibilities/Efficiencies/Improvements for Initial Alternative Plans

Dr Brad Foster (USACE) / Andy LoSchiavo (USACE)

Break Out Session 1 Objectives

BUILDING STRONG

1. Team understanding of each alternative (measures, output, function)
2. Identify improvements to alternatives (Flexibilities, Efficiencies, Effectiveness, Synergies).
   - Flexibilities – Measures that increase ability to adjust timing, location, and volume of flows to meet objectives given changing future conditions?
   - Efficiencies – Is there an alternative that achieves the same function/outputs as another alternative, but is simpler? Could a component of an alternative be substituted for another that is better at achieving the output/function?
   - Effectiveness – Could a component of an alternative be improved to deliver more output? Reduce risk?
   - Synergies – Could alternatives be combined to work even better together?

7. Outbriefs from Breakout Session

Breakout Group Leads

8. Public Comments

1. Your name
2. Your non-government organization (general public, if none)
3. Your comments are important

LUNCH

$6.00 to Beth Kacvinsky – Thanks

10. Improved Initial Alternative Plans and Criteria

Dr Brad Foster (USACE)

Screening Criteria

Flow Volume to Lainhart Dam

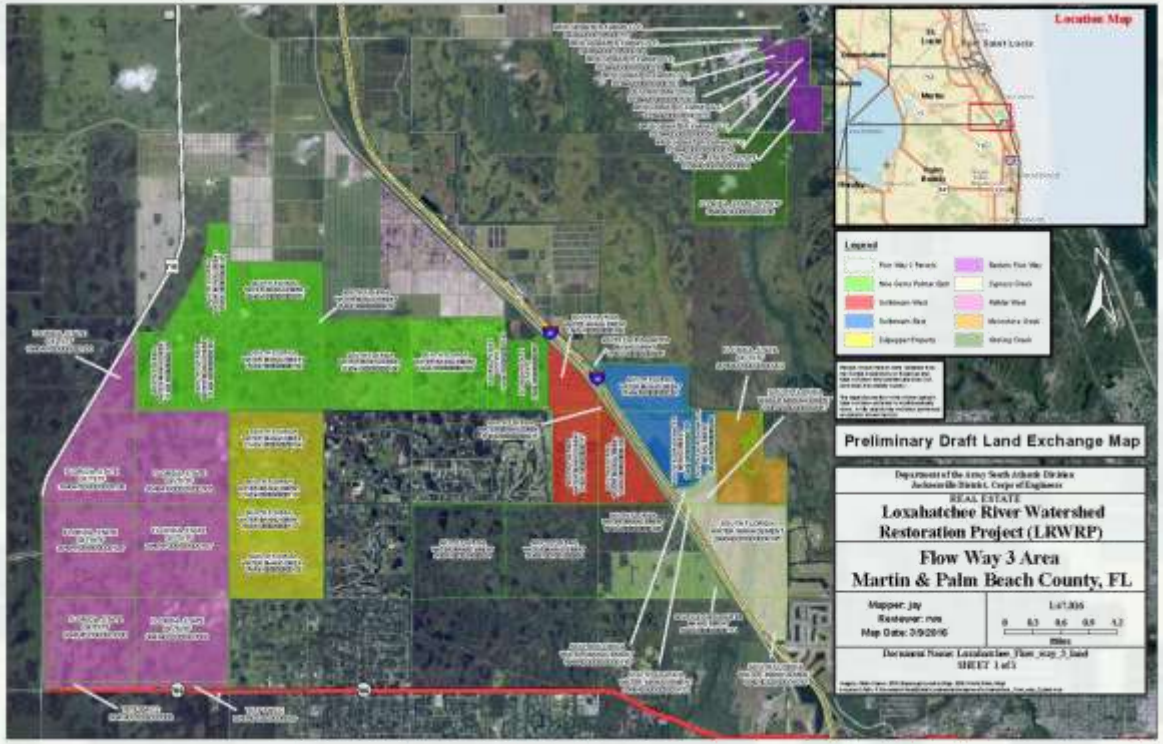
- Restoration Target
  - Dry Season (Dec. – May)
    - 70 cfs daily
  - Wet Season (Jun - Nov.)
    - 110 cfs for 120 days minimum
    - 35 cfs all other days
- Statistics Considered
  - % of dry season days greater than 70cfs
  - % of years that wet season target was met
  - # of MFL exceedance events
  - 95th percentile deficit with project features
- Scores:
  - Scored from 1 to 4, where 1 is existing condition and 4 provides the highest percent of wet/dry targets met with lowest annual deficit at 95th percentile

Timing of Discharge Northern Tributaries (Flowway 3 only)

- Ability to reduce scouring and damaging discharges
- Ability to change timing and/or distribution of flows to the tributaries
- Considers overall acreage of restoration and % of basin restored
- Scored from 1 to 4, where 1 is existing condition and 4 provides the best condition

Natural Storage

BUILDING STRONG



Identify:

1. Hydric Soils which indicate former wetlands
2. Existing degraded wetlands to be restored or enhanced
3. Calculate acres of natural storage and assign quartiles based on highest acreage for each flowway

Connectivity (Ecological)

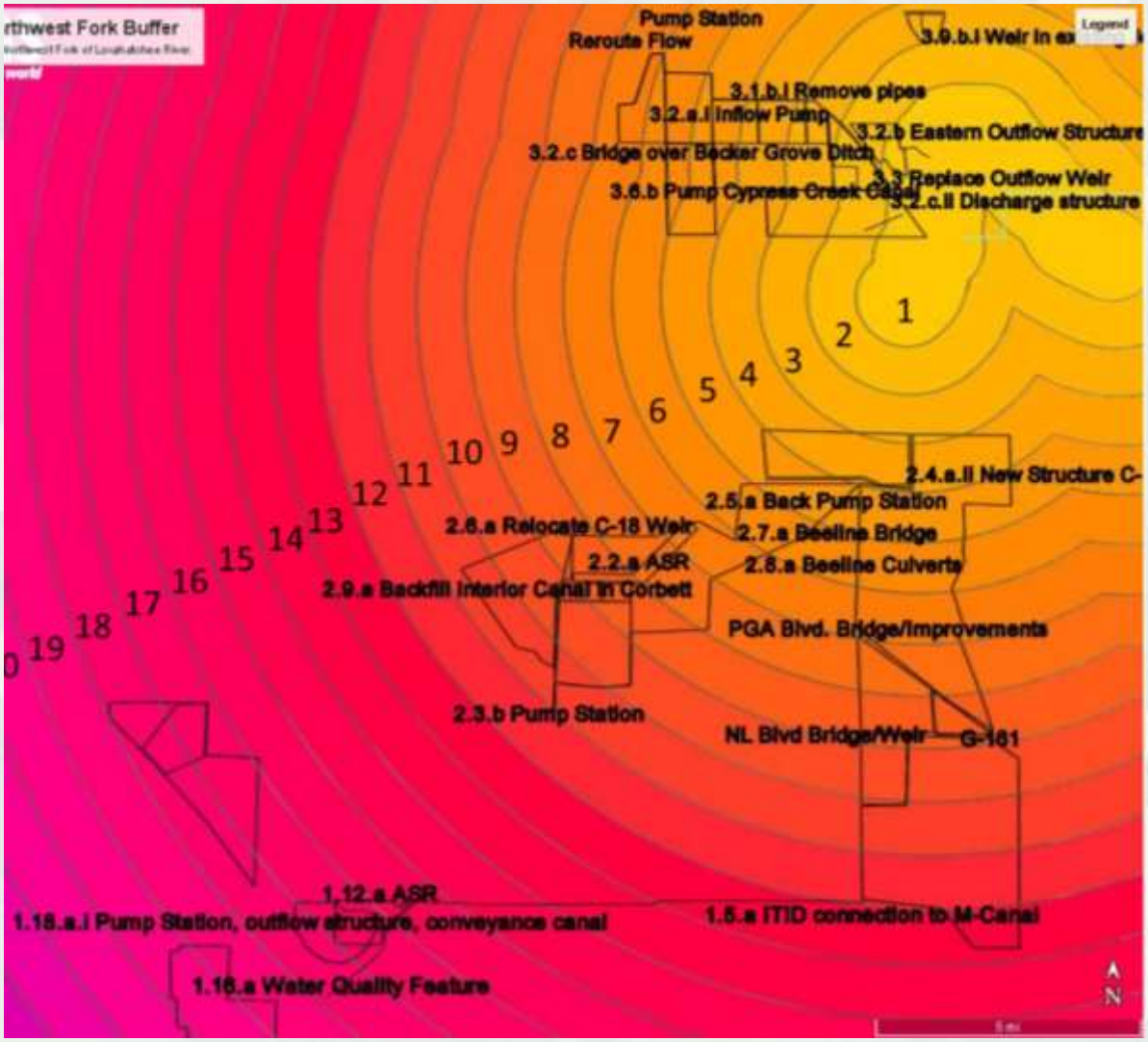
Used Performance Measure 9 criteria 3 (fish and wildlife)

- Reconnection is expected to promote improvements to species of concern:
  - genetic diversity
  - access foraging areas
  - access shelter and/or nursery area for listed species
- Scores:
  - 1 – FWO-just hydrologic connection
  - 2 – addressed 1 of 3 improvements
  - 3 – addressed 2 of 3 improvements
  - 4 – addressed 3 of 3 improvements

- Snail Kite,
- Eastern Indigo Snake,
- Florida Sandhill Crane,
- Manatee,
- Wood Storks

Nearness to Northwest Fork

BUILDING STRONG



1. GIS buffer in 1 mile increments
2. Overlay atop area hydrated by management option
3. Bracket closest and furthest distance for range by flowway.

   E.g., Flowway 3 Range (1-8) **miles from river:**

   - 4: 1-2 miles
   - 3: 3-4 miles
   - 2: 5-6 miles
   - 1: 7-8 miles

Robustness

- Ability to function effectively in the face of variability and uncertainty of future events (NRC 2007).
- Ability to perform under broad shifts, such as climate change and sea level change.
  - Increasing sea levels may require increased flow targets
  - Capacity to increase flows above existing targets may be desirable.
- Applicable to all Flowways
- Uses best professional judgement
- Score from 1 to 4 with 4 providing the greatest ability to continue to perform while needing minimal adjustments and 1 being least likely to continue to perform, with further adjustments likely

Flexibility

- Speed, ease, efficiency of moving water to adjust changing conditions such as storms or other real-time needs.
- Best professional judgment, example:
  - Large storage more flexible than small or no
  - Multiple storage options more flexible than a single
  - Controllable structures more flexible and fixed

- Score 4 = easiest and most efficient to adjust; maximum
- Score 3 = intermediate
- Score 2 = intermediate
- Score 1 = little or no flexibility or ability to control, adjust, or modify operations

11. Breakout Session – Screening Initial Alternative Plans to Focused Array

Dr Brad Foster (USACE) / Andy LoSchiavo (USACE)

Breakout Session 2 - Objectives

1. 7 Groups evaluate each alternative using a single scoring criteria.
2. Combined results will help identify top 5 performers.

12. Outbriefs from Breakout Session

Breakout Group Leads

13. Focused Array and Next Steps

Dr Brad Foster (USACE)

14. Public Comments

1. Your name
2. Your non-government organization (general public, if none)
3. Your comments are important
   - Comments will be considered, as appropriate

Meeting Adjourned

Thanks for your attendance and participation!