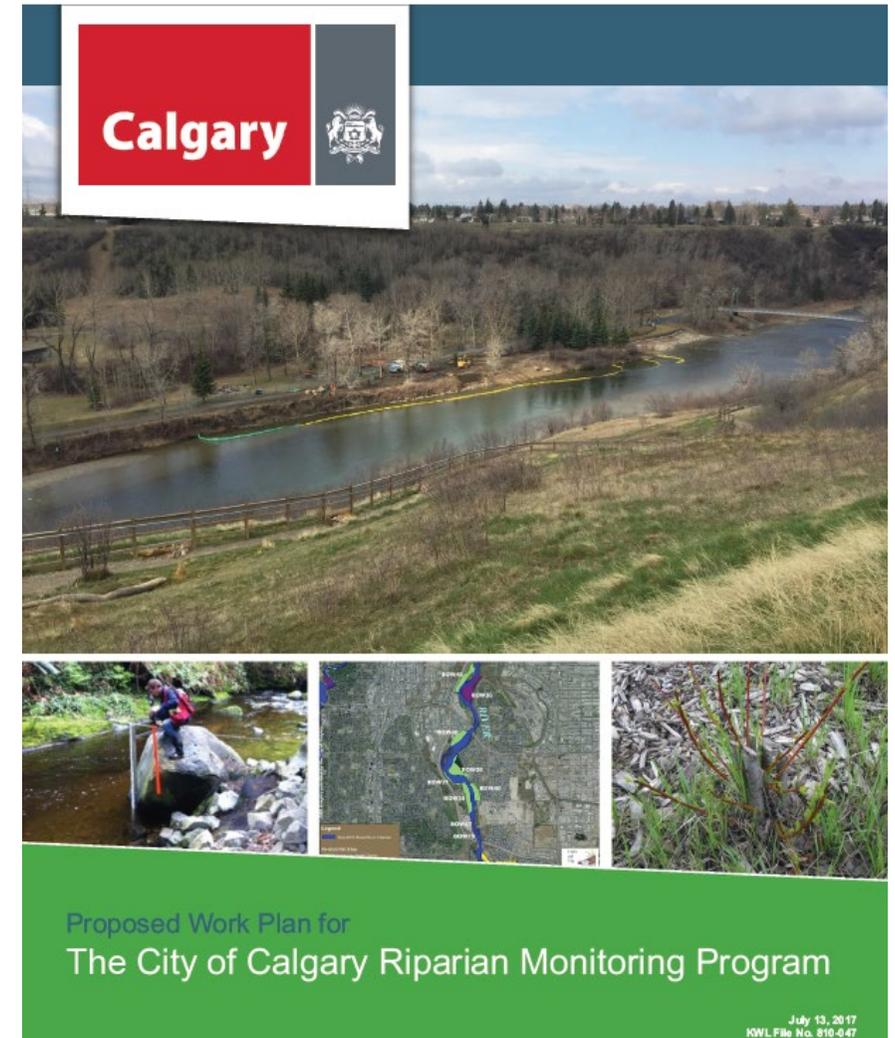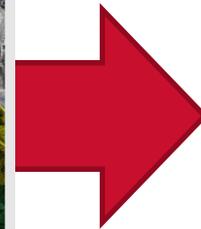# The Riparian Monitoring Program (RMP) Overview

Norma Posada, Watershed Engineer, P. Eng, M.Eng.

The City of Calgary

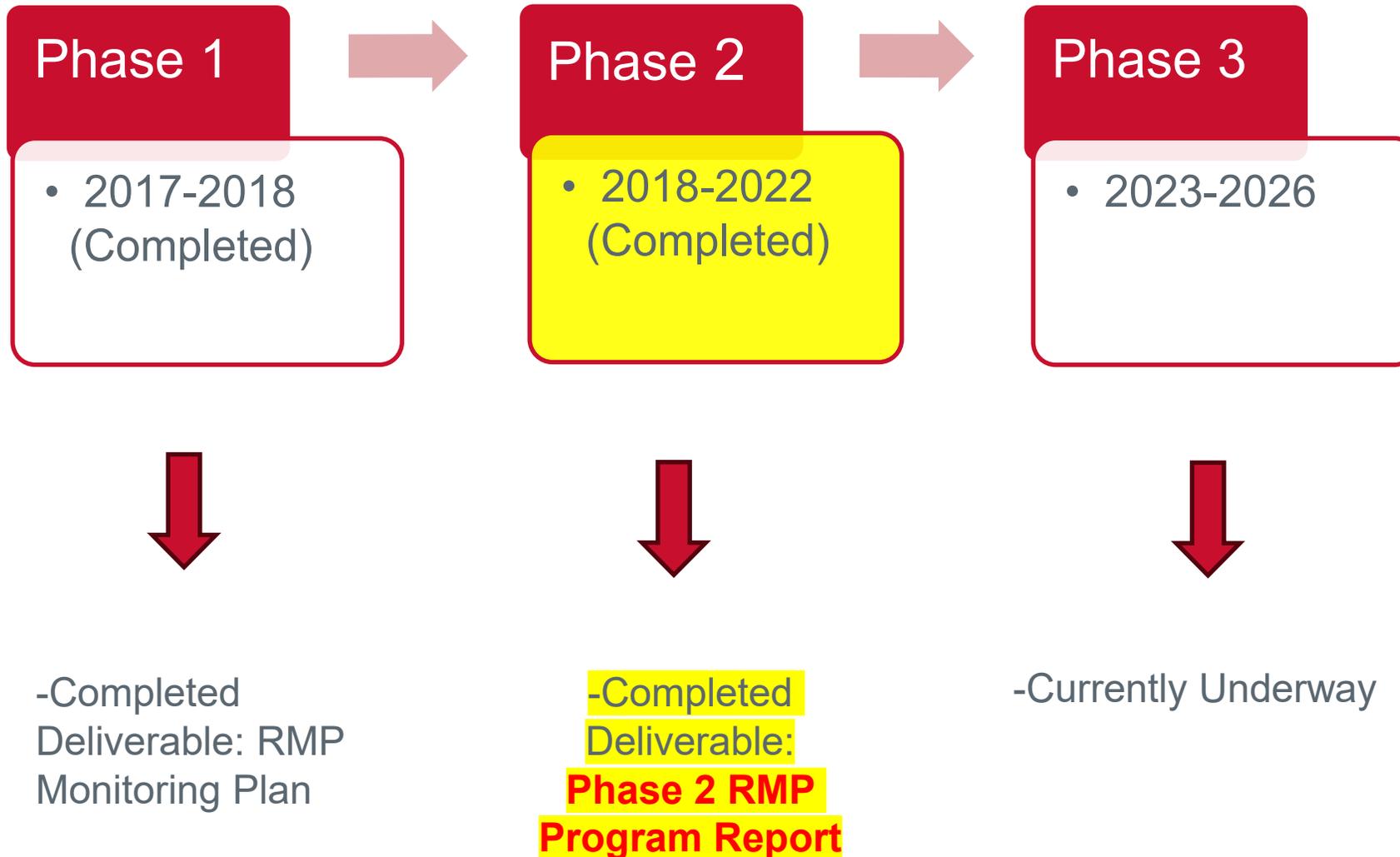# RAP Key Action: *Monitor Riparian Health and Evaluate Performance*

- The City of Calgary Riparian Monitoring Program-
- initiated in 2017
- Prime consultant: Kerr Wood Leidal Ltd.
- Several subconsultants are part of the team

Riparian Monitoring Program Timelines (Phases 1, 2 and 3)

Phase 1 → **Phase 2** → **Phase 3**

Phase 1	Phase 2	Phase 3
• 2017-2018 (Completed)	• 2018-2022 (Completed)	• 2023-2026

-Completed Deliverable: RMP Monitoring Plan

-Completed Deliverable: **Phase 2 RMP Program Report**

-Currently Underway

Final RMP Program Report

(www.calgary.ca/riparian)

(Section: "*Measuring Riparian Health over Time*")

- 600-page document
- Executive Summary, Technical Summary
- Detailed monitoring results, findings, conclusions, recommendations, etc.
- Appendices: maps, case studies, project site dashboards, etc.

Phase 2 Monitoring Components

Effectiveness Monitoring

Trend Monitoring

Evaluate the effectiveness of bioengineering/riparian planting techniques

Monitor riparian health trends and progress to achieve the 2026 RAP *target*

Bank Restoration Projects

Riparian Planting Projects

Riparian Health Inventory Sites

Site 73 – Sue Higgins Park Timber Crib Wall

Site 29 - Sue Higgins Park - Riparian Uplift

BOW74 - Inglewood Bird Sanctuary

Original Slide: KWL

- Evaluate the effectiveness of:
  - Bioengineering techniques
  - Maintenance procedures
- Identify advantages and limitations of bioengineering techniques
- Develop recommendations for:
  - Design improvements
  - Future long-term monitoring needs
- Reporting
  - Annual monitoring reports
  - Final program summary report

Original Slide: KWL

Monitoring Sites located along Major Rivers and Creeks

Bioengineering Techniques

BRUSH LAYER

BRUSH MATTRESS

FASCINE

LIVE STAKING

PLANTING

VEGETATED CRIB WALL

VEGETATED RETAINING WALL

WATTLE FENCE

VEGETATED RIPRAP

Typologies and Age Class

- Sites were classified into 5 typologies

- Bioengineering techniques can range from 100% plant-based to more structural techniques

- Three age class categories were used: Y1, Y3, Y5+

Vegetated Riprap
Riprap bank protection with live cuttings inserted within the rock / joint planting

Vegetated Retaining Wall
MSE walls, or vertical earth/concrete walls with live cuttings inserted

Vegetated Crib Wall
Vegetated crib wall with live cuttings

Primarily Vegetative
Brush Mattresses / fascines / brush layers / wattle fences / live staking / vegetated soil wraps

Planting
Seeding, live staking and or rooted stock planted along shoreline of river and creek banks

General Effectiveness Monitoring Approach

- Develop data collection methods and rating system
- Assess selected sites – desktop and field assessments
- Conduct statistical analysis
- Identify successes and learnings
- Develop recommendations.
- Annual and final report

Rating
Design
Implementation
Maintenance
Success
BRQI

Score	Categories
75-100	Good
50-74	Fair
0-49	Poor

Photo 3-4: Existing vegetation elevation survey

Photo 3-5: Structure assessment

Photo 3-6: Pin-point transect

Photo 3-7: Quadrat

Bank Effectiveness Monitoring - Key Facts

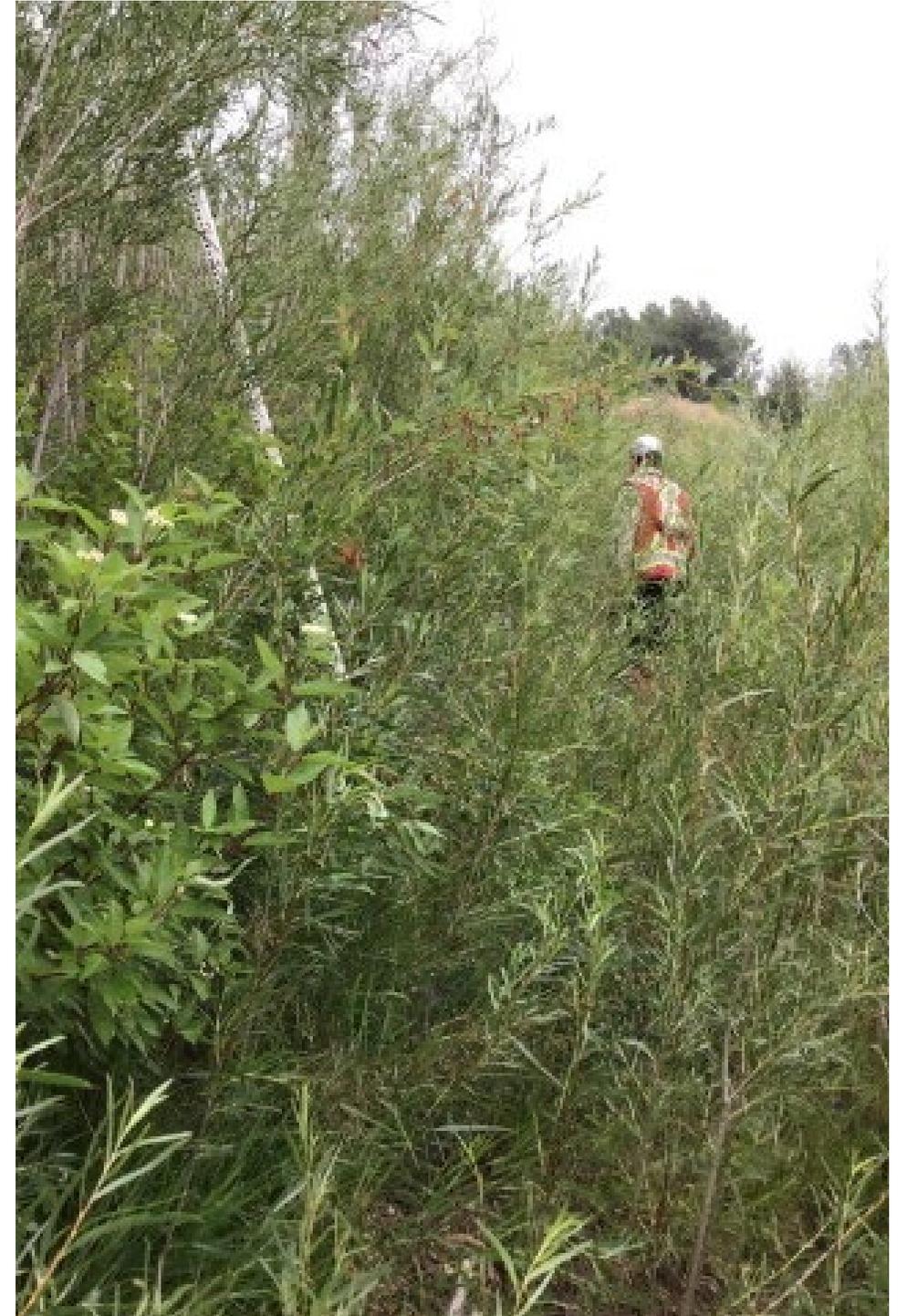| Quick Facts	Bank Effectiveness
Data Collection Years	2018-2022
Number of Individual Sites Assessed	69 (52- City projects; 17- external projects)
Total Number of Assessments (Revisits)	Detailed: 99
Site Locations	Bow River, Elbow River, Nose Creek, West Nose Creek, Shaganappi Creek, Confederation Creek, Forest Lawn Creek
Monitoring Extent and Vegetation	7.6 km of bank; 10,912 trees and shrubs
Quick Facts from Effectiveness Vegetation Assessments	~8,000 plantings, ~8,400 cuttings from 39 species ~300 transects; ~900 quadrats

Examples of General Bank Effectiveness Findings

- Project Documentation
- Physical Stability and Material Condition
- Habitat Enhancements
- Vegetation Design and Installation- planting timing
- Site-Specific Limiting Factors and Failure Sites
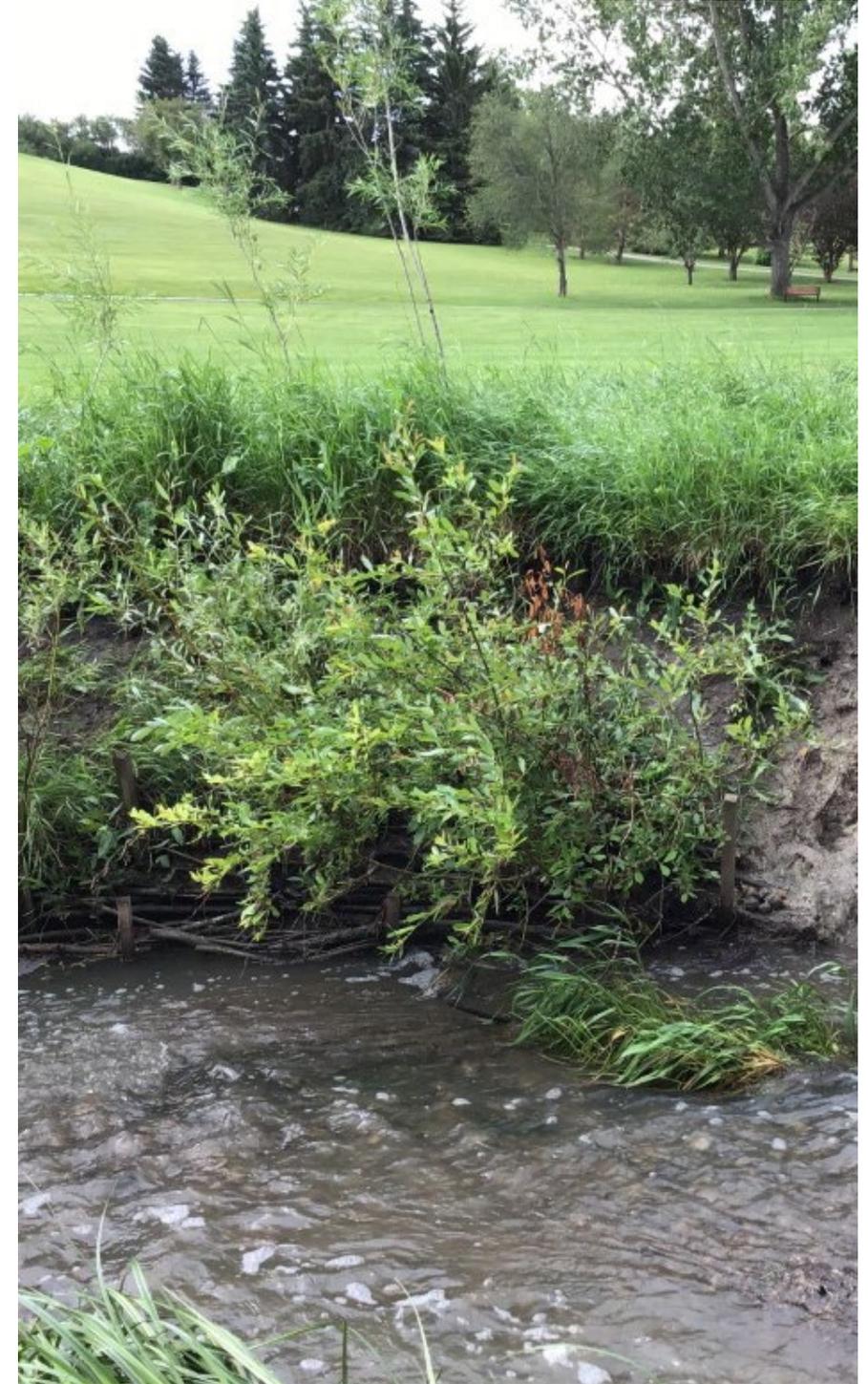
Examples of Bank Effectiveness Statistical Results

- Woody Vegetation Survival and Growth:
    - Vegetation Year 1 age class survivorship
    - Woody vegetation growth data (Y1, Y3 and Y5+)
    - Woody vegetation canopy cover and density of living shoots
- Seeding Germination Success
- Beneficial Practices
    - Soil amendment
    - Fencing around sites
- Soil compaction impacts on vegetation growth
- Bioengineering technique success
- Invasive plant species

Original Slide: KWL

Monitoring Issue	Key Results
Average Year 1 survivorship of container plants versus live cuttings	94% versus 69%
Overall woody vegetation Year 1 survival	76%
Average overall rating for all projects assessed by age class	Year 1: 67/100 (Fair) Year 3: 65/100 (Fair) Year 5+: 69/100 (Fair)
Number of failure sites • *(Y1 Failure: works missing, degraded or ineffective and woody vegetation survival < 25% (Most common reason)* • *Y3, Y5+ Failure: works missing, degraded or ineffective.*	7 out of 69

Monitoring Issue	Key Results
Highest rated technique • Ranking method included 5 woody vegetation growth parameters (Year 1 survival, leader growth, shoot length, diameter, and canopy cover). • Limitations: assessment did not consider cost, construction complexity, or regulatory approval requirements/timelines. • Consider site conditions and experience. • There are valid reasons to use any of the techniques.	1. **Brush Mattress** 2. Vegetated Crib Wall 3. Vegetated Retaining Wall 4. Brush Layers 5. Fascine 6. Vegetated Riprap 7. Plantings 8. Live Staking
Best performing shrub species (plantings and cuttings)	Sandbar willow (*Salix interior*)
Percentage of sites at which Canada thistle (most common weed)	89%

Special RMP Project: the Bioengineering Demonstration and Education Project (BDEP)

- Partnership between AEPA and The City of Calgary
- Constructed in 2019
- 10-yr Monitoring Plan
- Fish/Fish Habitat, Wildlife, Riparian Health, Bioengineering Structural Integrity
- 15% increase in riparian health since 2016
- Improved fish habitat, wildlife and bioengineering structural integrity

www.calgary.ca/bdep

2013 –Post Flood

2019

Forest Lawn Creek

2008

2018

2008

2018
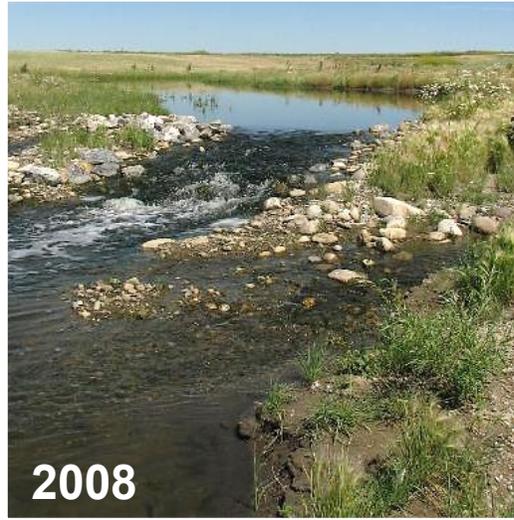
THANK YOU

Contact: norma.posada@calgary.ca