

Development of a Groundwater Management Area Plan for the Lower Yakima Valley

Requirements and Status

Stated GWMA Goal

The goal of the Lower Yakima Valley GWMA is to reduce nitrate concentrations in groundwater below state drinking water standards.

Achieving the GWMA Goal

Understand the nitrogen contribution of major land uses and develop strategies & practices to minimize nitrogen (nitrate) movement into underlying aquifers

Develop GW monitoring plans to verify the effectiveness of land use management activities in limiting downward movement of nitrogen(nitrate)

Achieving GWMA Goal

$$\text{Nitrogen Applied} - (\text{Nitrogen Utilized} + \text{Nitrogen Lost}) = N_{GW}$$

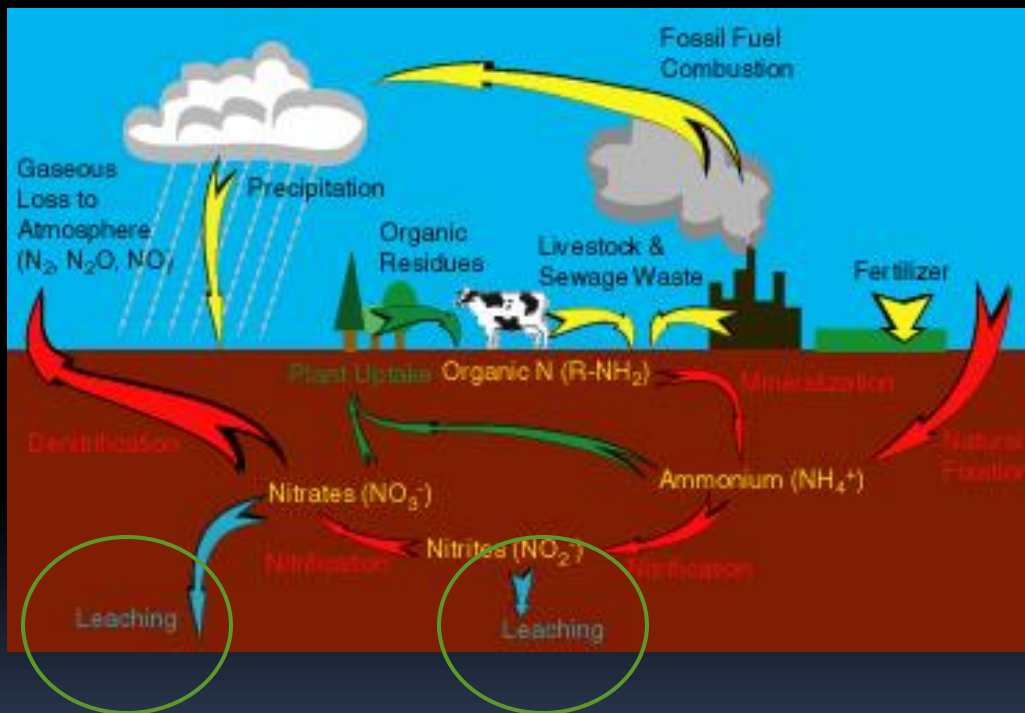
Nitrogen Applied: *N Fertilizer, Manure, N in irrigation water
Residual soil N, Decomposition of plant and
animal residues, Mineralization of soil organic
matter*

Nitrogen Utilized: *Crop removal*

Nitrogen Lost: *Volatilization, Denitrification*

N_{GW} : *Leaching to GW (Goal is zero or better)*

Achieving GWMA Goal



Nitrogen loading is calculated and the various loss mechanisms are evaluated to arrive at the "amount" of nitrates leaching to ground water

Leached amount \leq Numeric Goal

GWMA Process

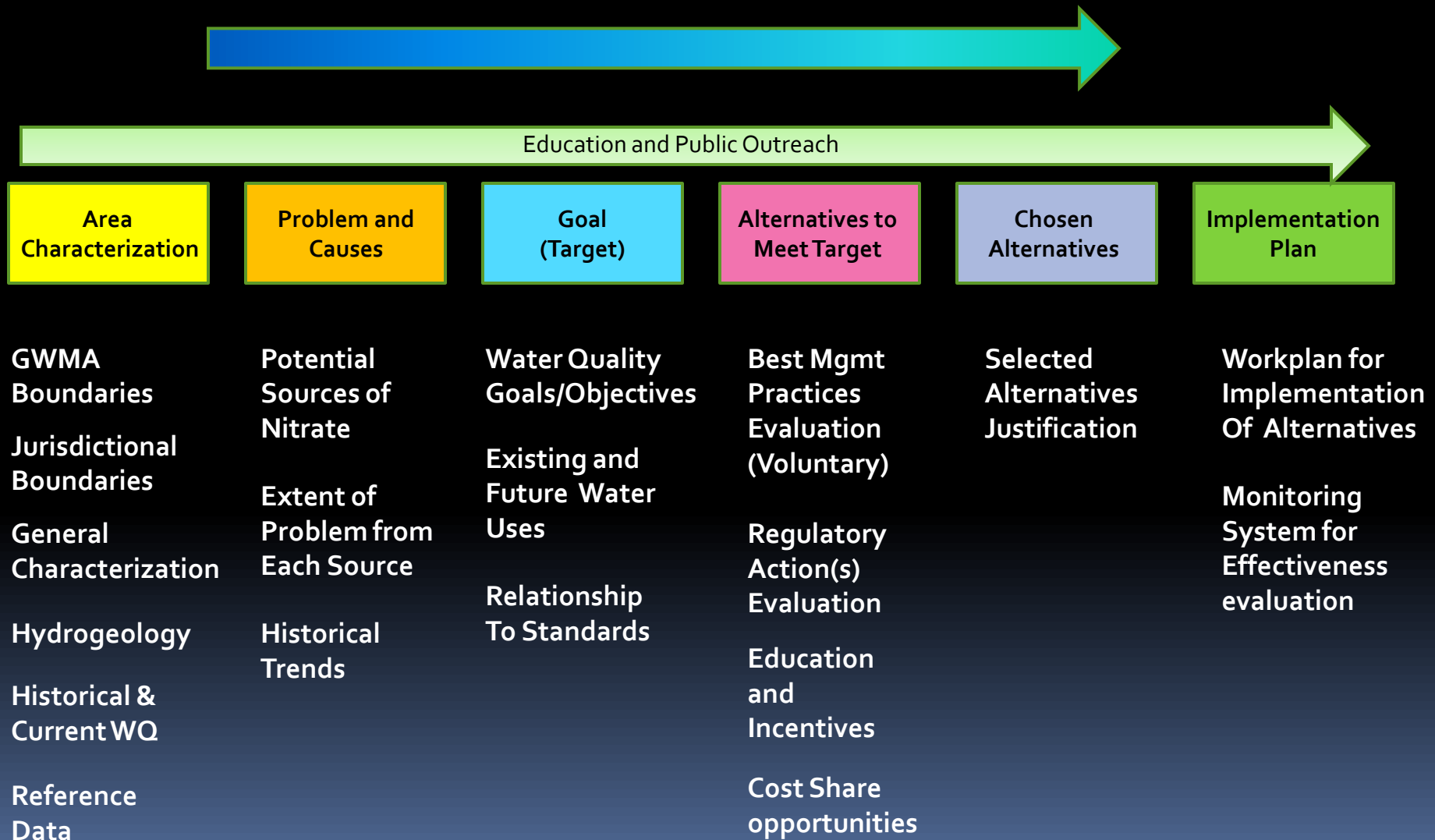
The GWMA process is designed to produce several outputs including assess current water quality conditions and establishing links between those conditions and activities at the land surface

In each step of the process, data gaps are identified and actions are taken to address those gaps

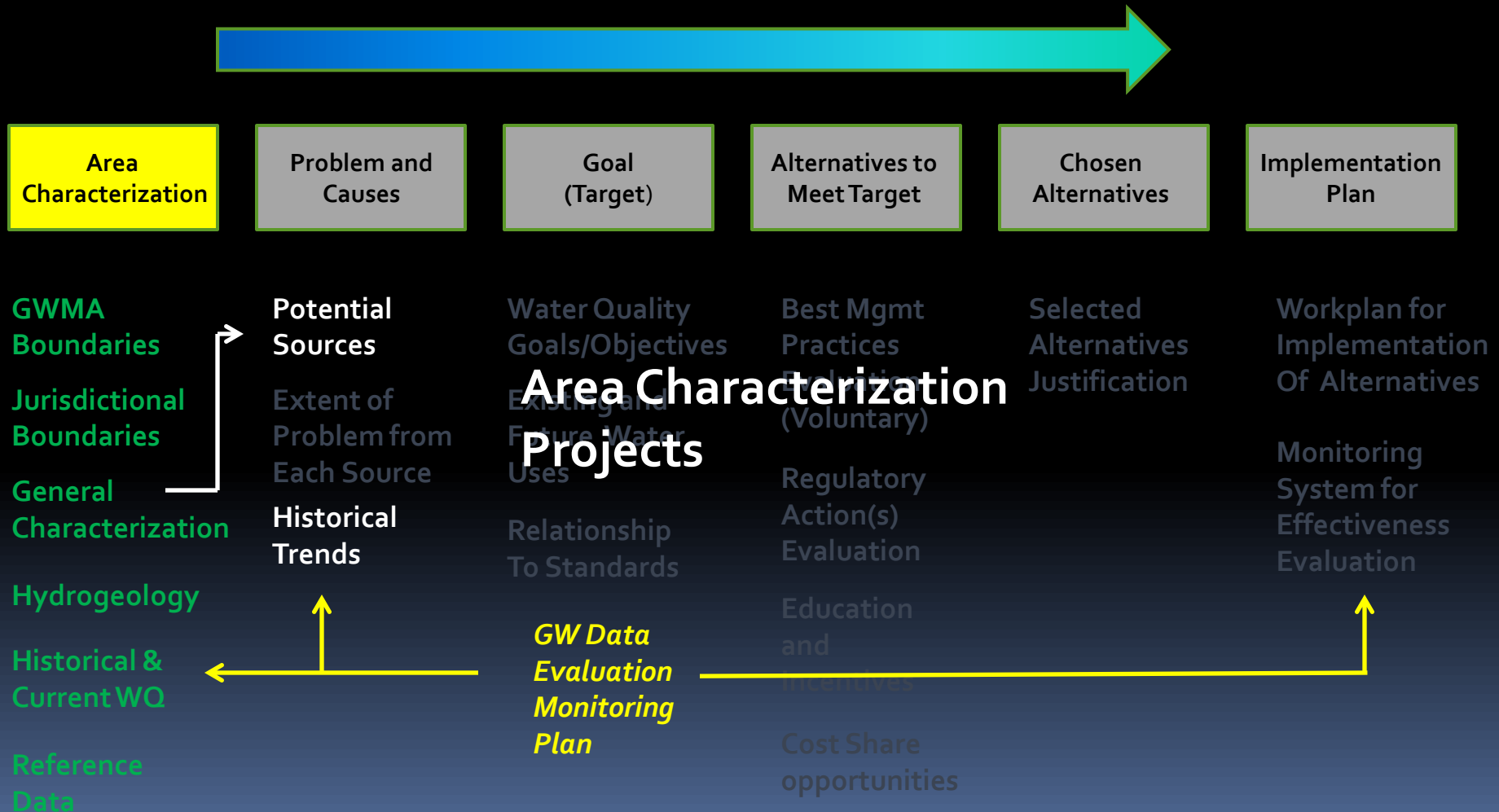
Knowledge collected and acquired informs and influences decisions and recommendations in subsequent GWMA steps

Final recommendations and actions are only as good as the information previously collected

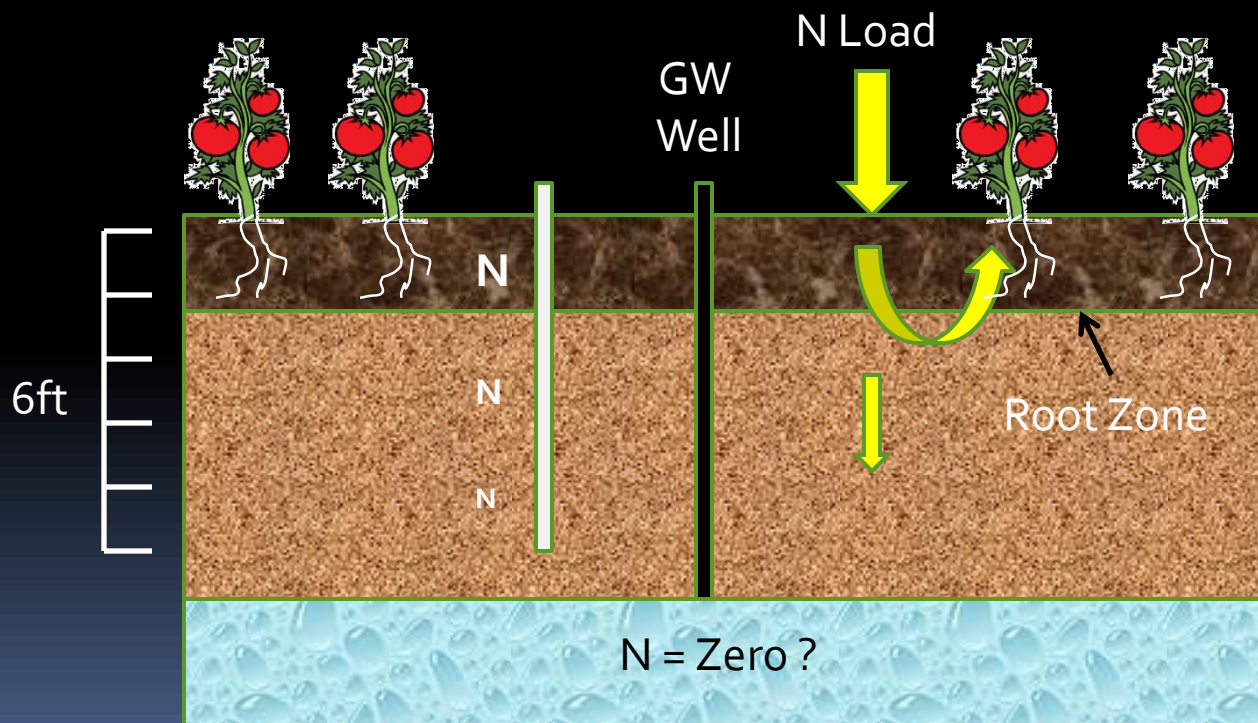
Contents of the GWMA Process



GWMA Process



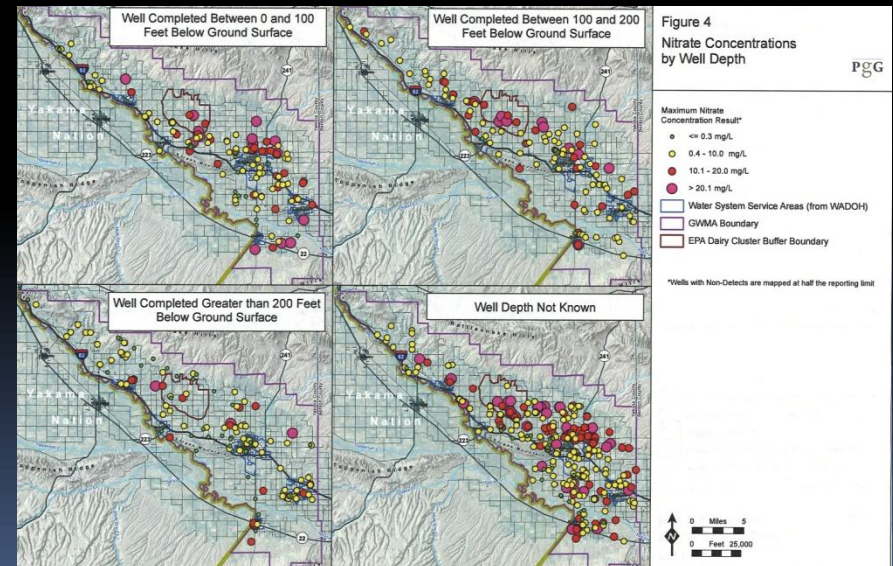
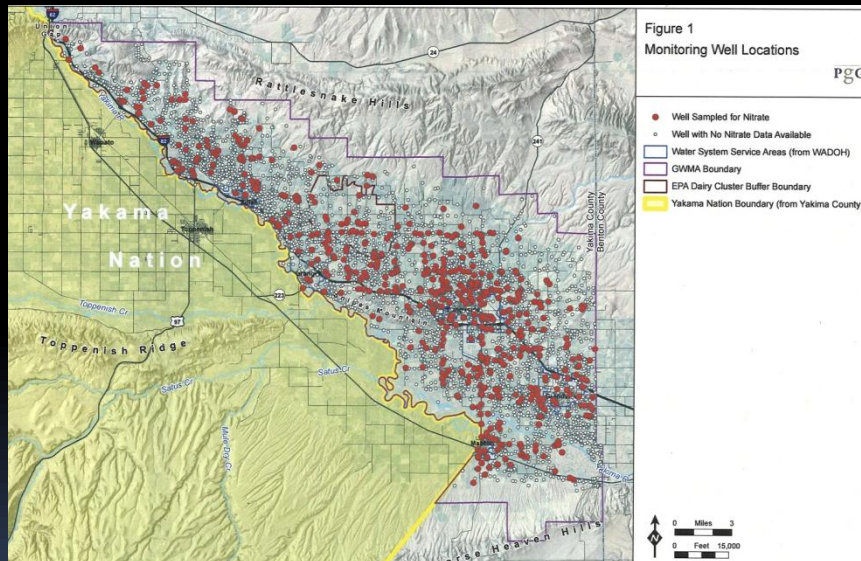
GWMA Projects and GWMA Program Site Specific GW Monitoring



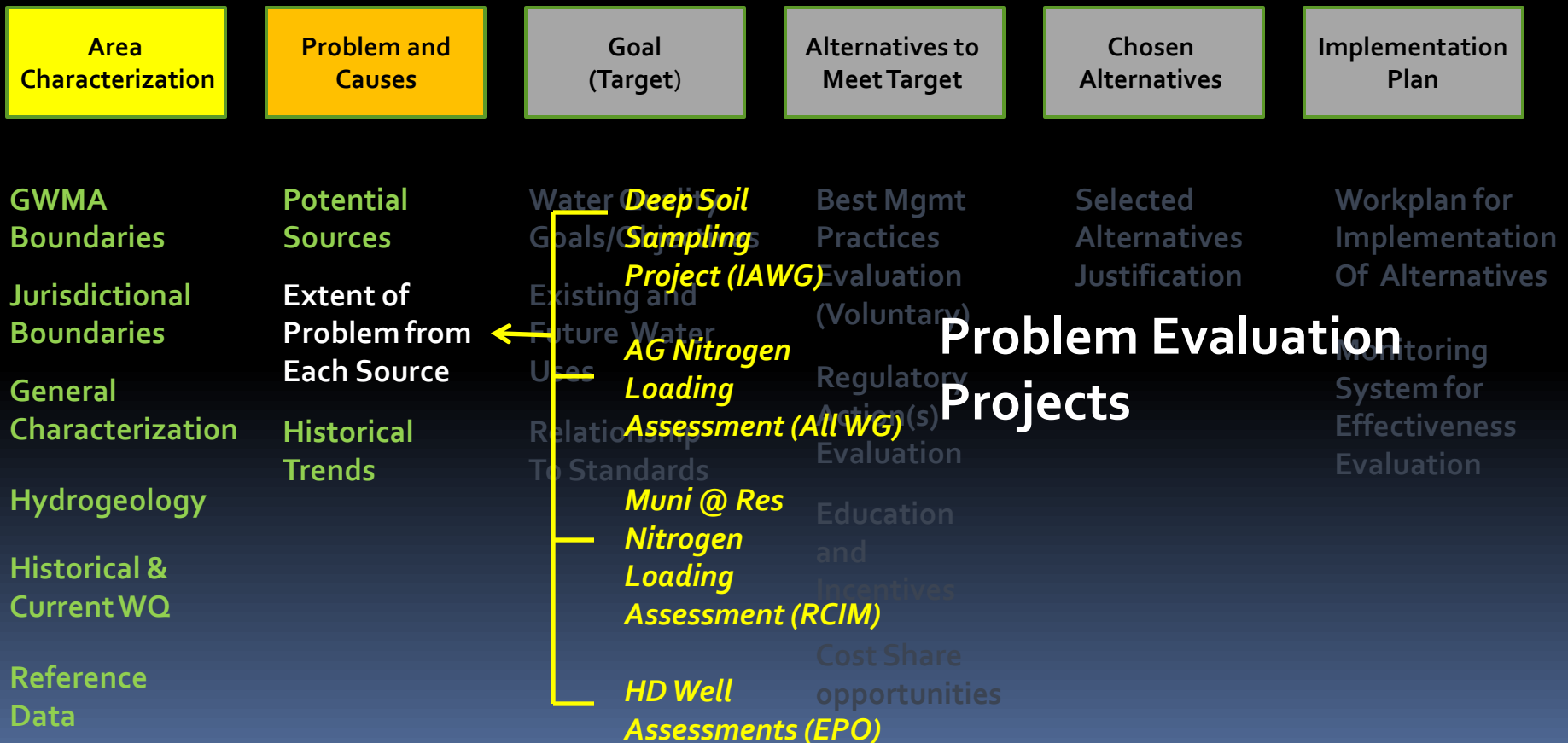
Site specific GW monitoring allows for a measure of N leaching below the root zone, entering the top of the uppermost aquifer

Supportive data regarding effectiveness of current/past practices

GWMA Projects and GWMA Program Basinwide Groundwater Monitoring Assessment



GWMA Process

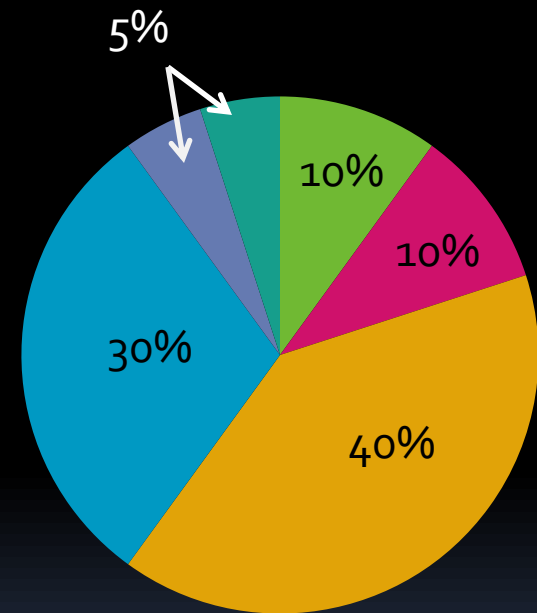


Extent of Problem from Each Source



Before Assessments

- Source 1
- Source 2
- Source 3
- Source 4
- Source 5
- Source 6



After Assessments

for demonstration purposes only

Achievements of Evaluation Projects

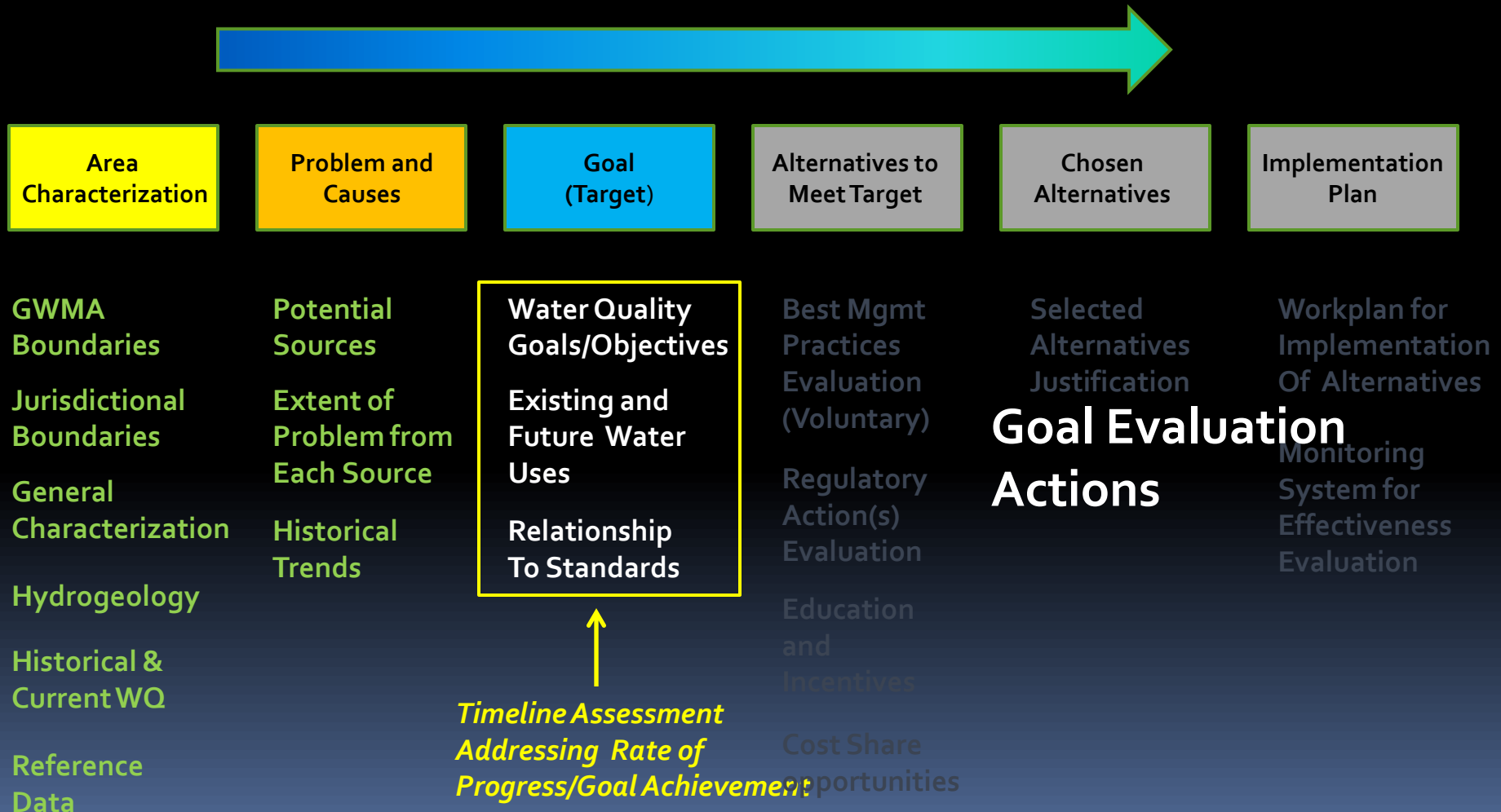
Relative nitrate contributions to GW from major land uses quantified allow for management focus in critical areas/activities

Evaluate irrigation practices in relationship to downward nitrate movement

Provides data to refine priority areas and populations where nitrate in drinking water is of critical concern

Provides data to refine GWMA groundwater monitoring system and quantify effectiveness of current and future land use management practices

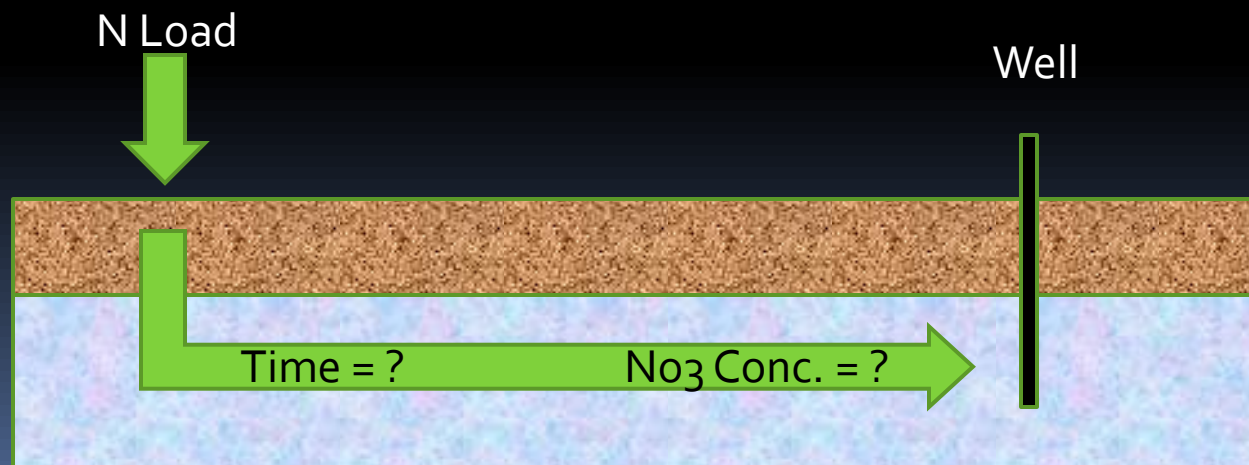
GWMA Process



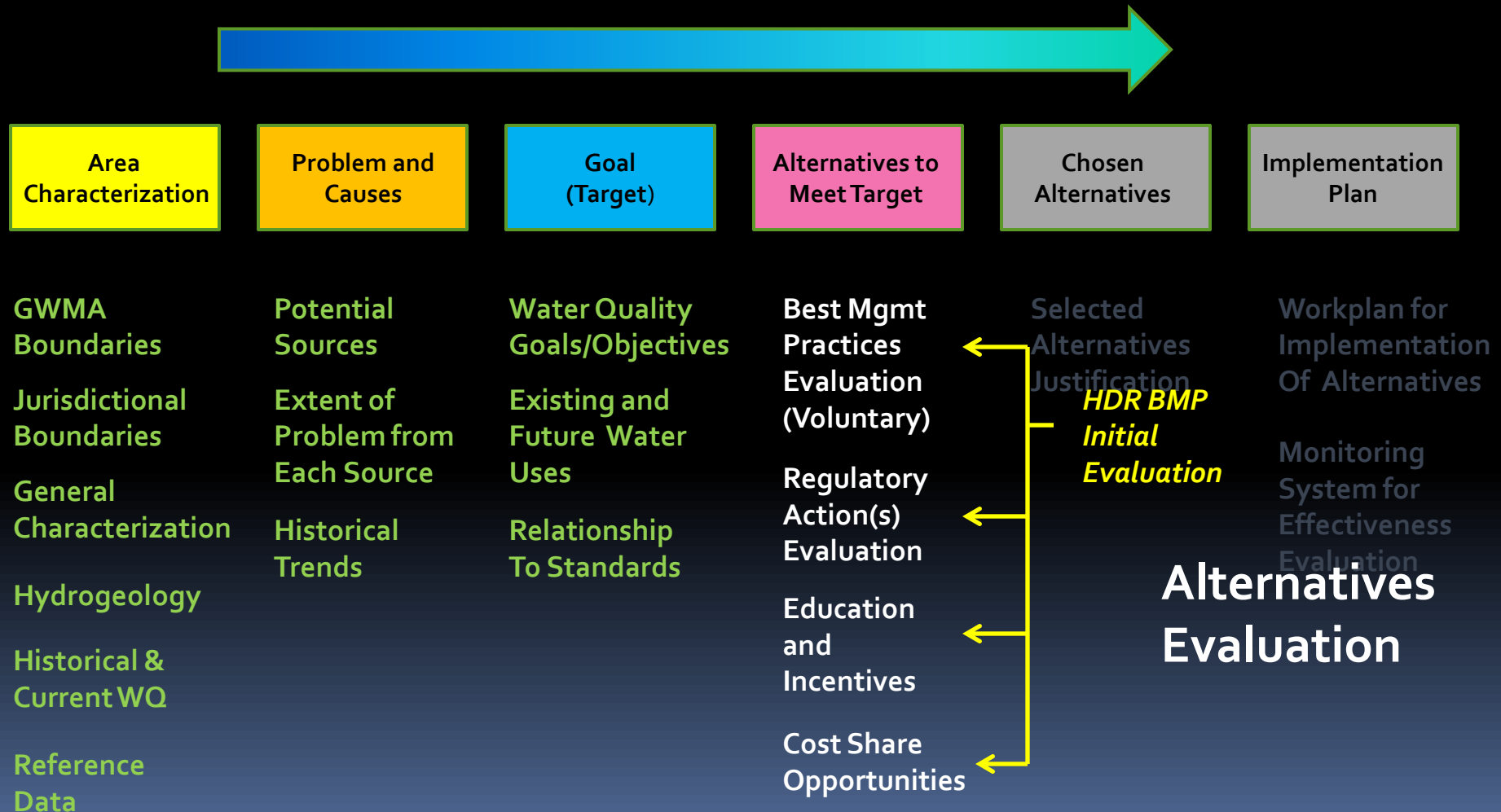
Goal Evaluation Actions

Evaluate hydrogeology and N loading data to develop estimate of timelines to achieve goals at both a basin wide and sub-basin level

Provide data to GWAC regarding further potential predictive modeling



GWMA Process



Alternatives Evaluation

Evaluation done in terms of:

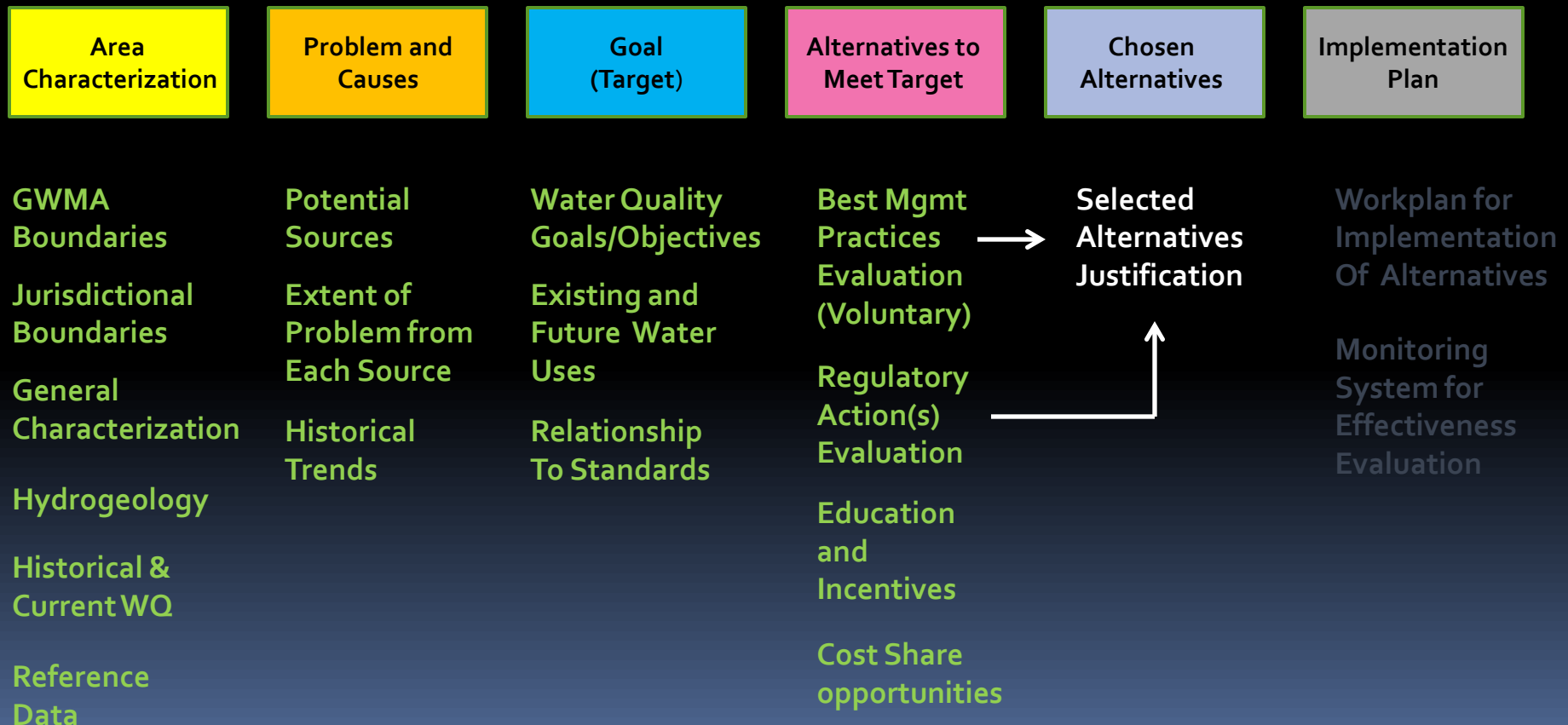
- ❖ *Feasibility*
- ❖ *Effectiveness*
- ❖ *Cost*
- ❖ *Difficulty to implement*
- ❖ *Consistency with local comprehensive plans*

Additionally:

- ❖ *Gaps in regulatory authority*
- ❖ *Technical assistance vs. enforcement*

GWMA Process

Alternatives Justification



Alternatives Justification

Alternatives are developed in consideration of all previously collected data and analysis

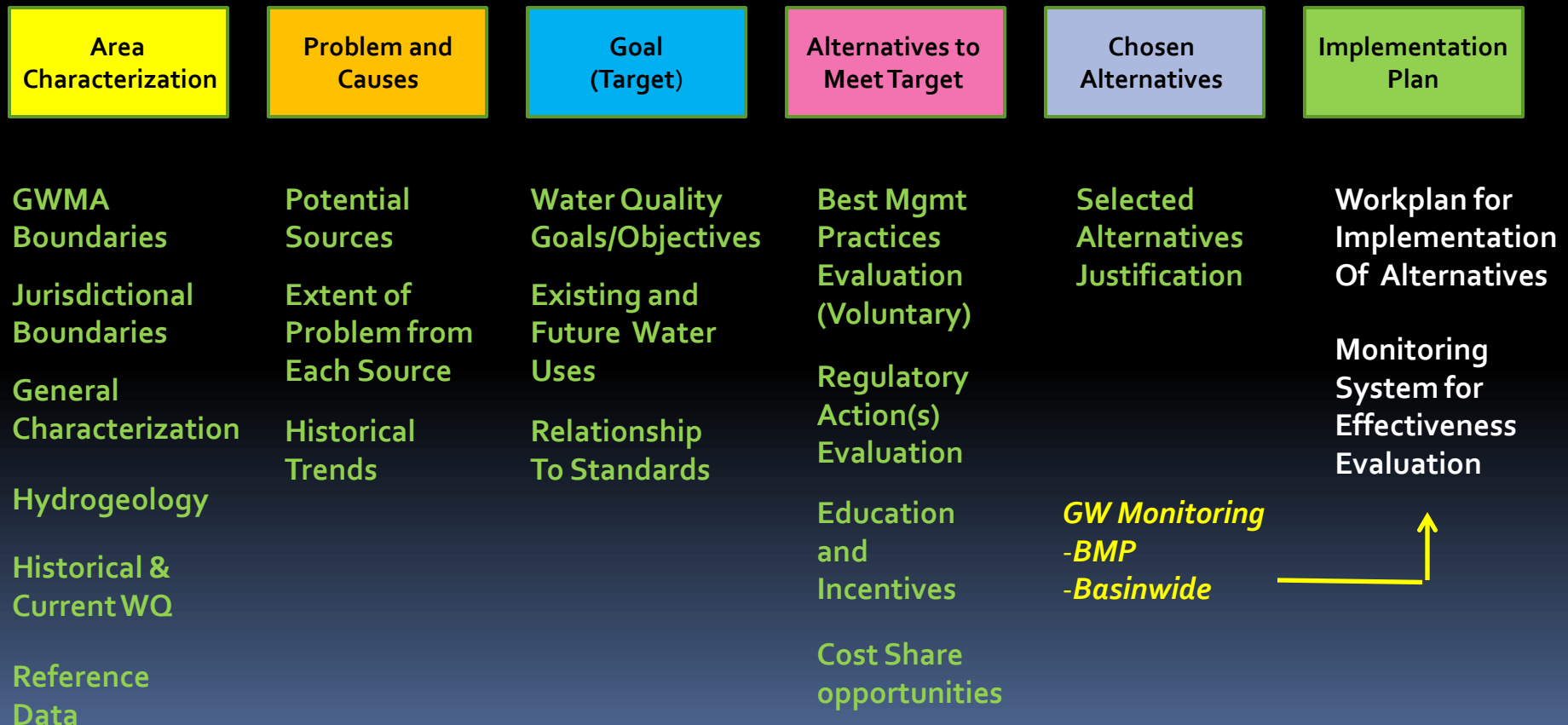
Selected alternatives should be based on local needs and goals

Alternatives are not necessarily confined to Best Management Practices

Need to be implementable !!!!!!

GWMA Process

Implementation Plan



Implementation Plan

Specify recommended management actions necessary to achieve stated goals

Identify existing policies, rules, interagency agreements,

*Identify needs for proposed legislative changes,
proposed amendments to local comp plans*

Monitoring Plan

Develop monitoring plan to address:

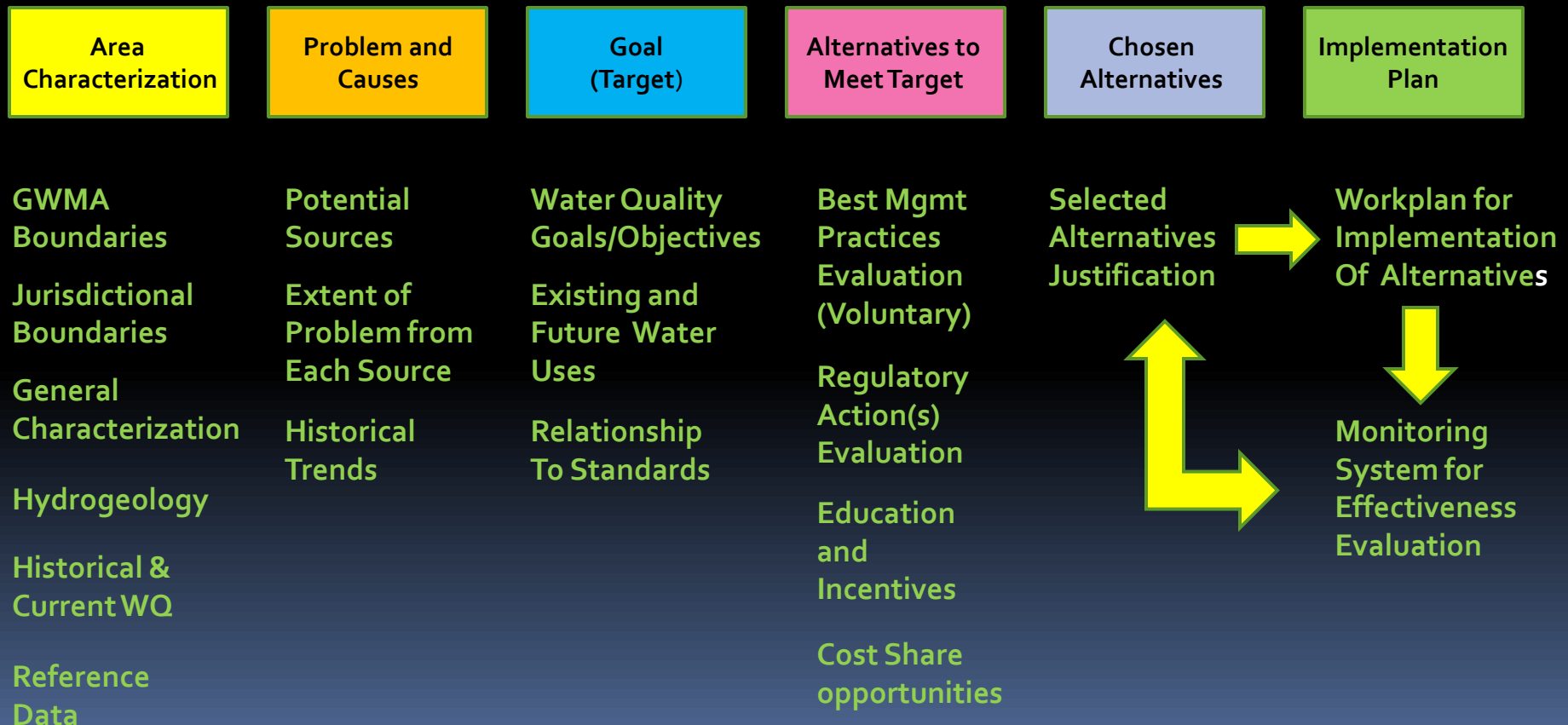
Overall progress of changes to land use management actions recommended by implementation plan

Provide for specific analysis of individual best management practices

Provide for specific effectiveness analysis of individual mandatory actions

GWMA Process

Adaptive Management



Adaptive Management

The implementation plan should include provision(s) that allow for modifications to the initial recommendations based upon the results obtained through environmental monitoring

This also includes recommendations for any new or modified rule, ordinance, policy, etc.

This is also part of a periodic review of the groundwater management plan

Prescriptive vs. Adaptive Approach

The Groundwater Management Area rule is based upon an adaptive approach.

As additional data is gathered and effectiveness is evaluated modifications to initial recommendations may be required.

This process may extend for longer periods as monitoring indicates the need for modified or new approaches.

Prescriptive approaches are those that are specific in nature and are generally reserved to address threats to human health and the environment within a short time frame.

Critical Discussion Points

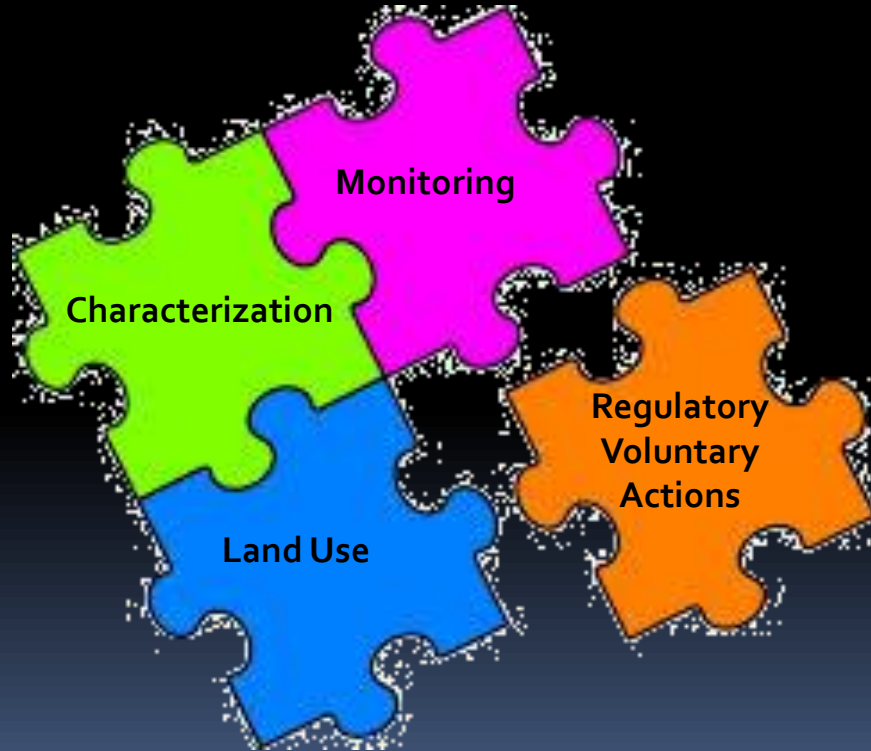
Quantifying the amount of nitrogen (nitrate) leaching into underlying groundwater is key to understanding how well current management actions are working to limit excess nitrogen

The better the quantification the more effective the final recommendations regarding voluntary or regulatory actions

The degree to which an understanding of nitrogen loading and behavior will drive the process to either a BMP based process or a focused monitoring based process

Critical Discussion Points

Every aspect of the GWMA process is critical to influencing the final recommendations



Questions?