

# **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

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

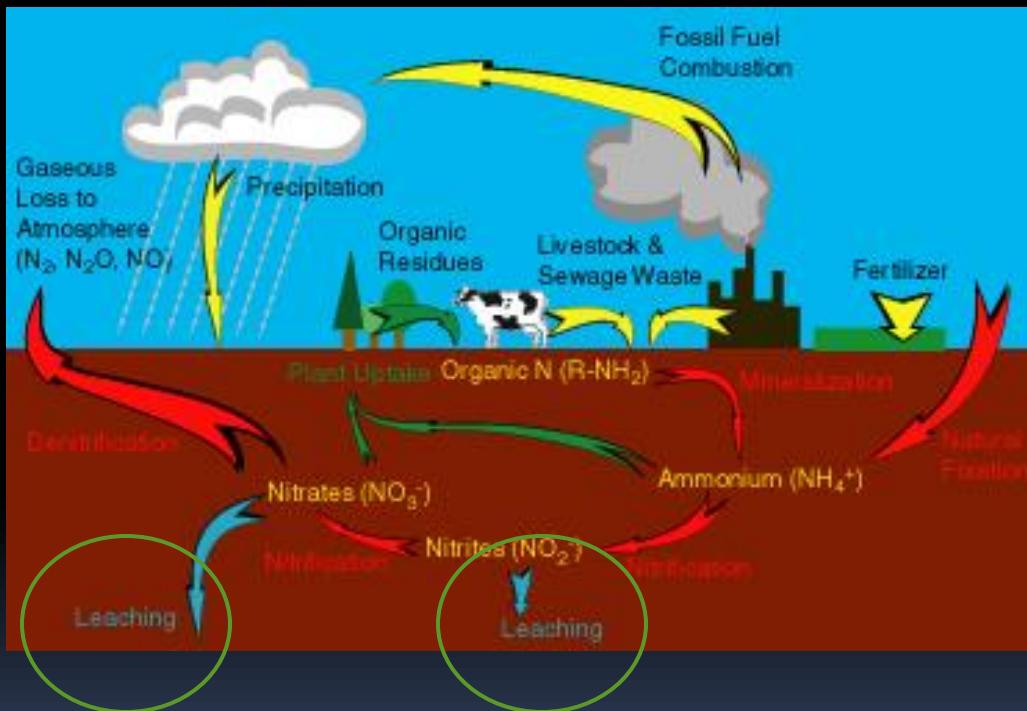
**Nitrogen Applied:** *N Fertilizer, Manure, N in irrigation water  
Residual soil N, Decomposition of plant and  
animal residues, Mineralization of soil organic  
matter*

**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

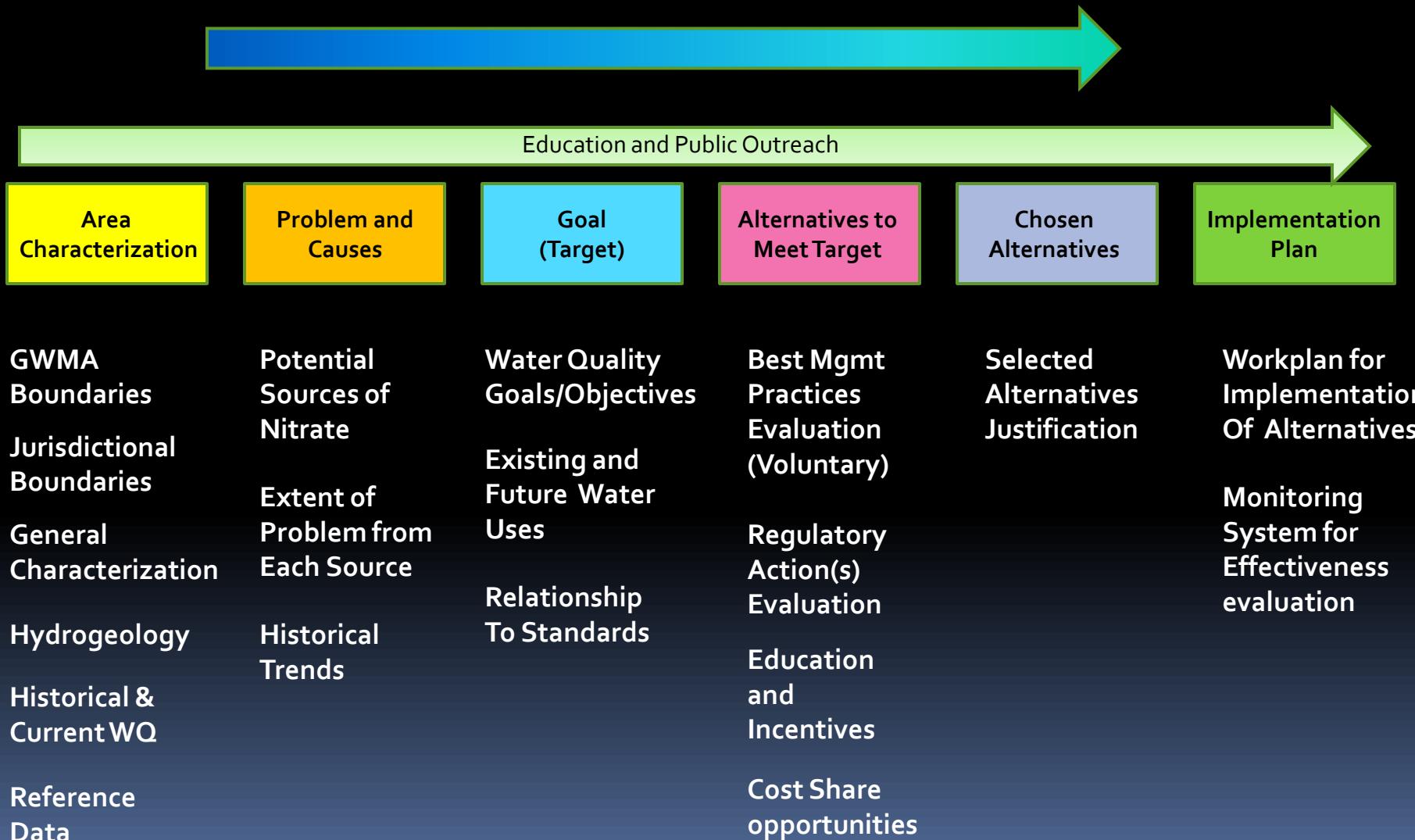
*The GWMA process is designed to produce several outputs including assess current water quality conditions and establishing links between those conditions and activities at the land surface*

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

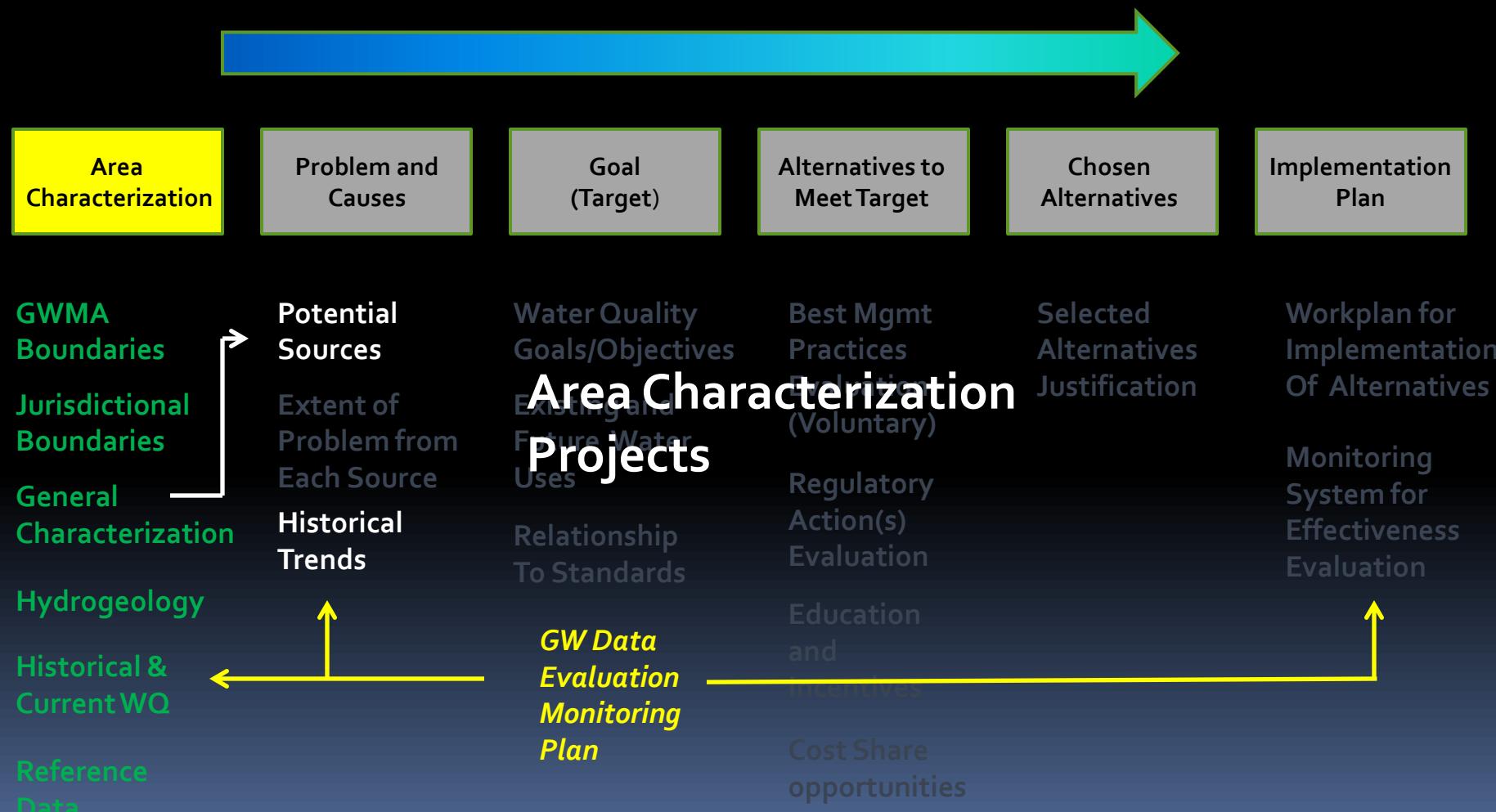
*Knowledge collected and acquired informs and influences decisions and recommendations in subsequent GWMA steps*

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

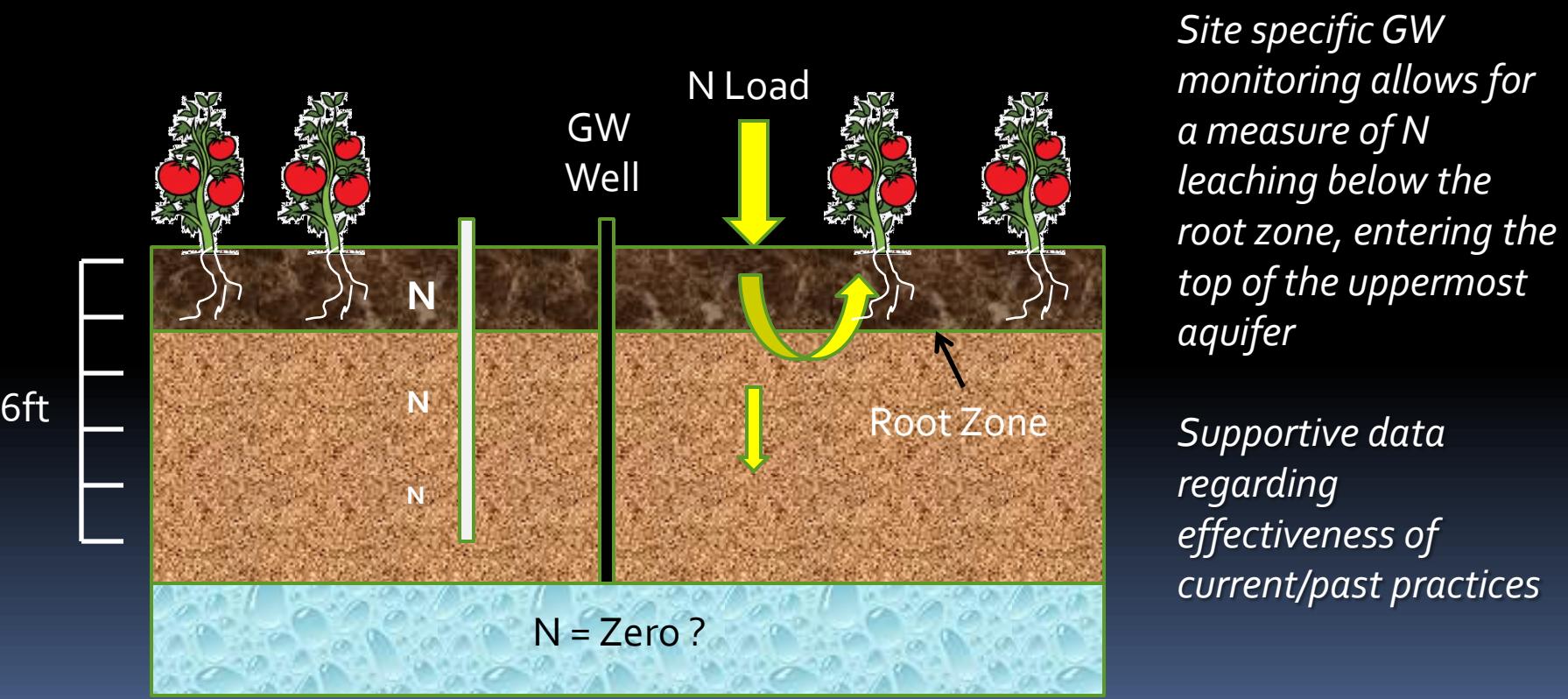
# Contents of the GWMA Process



# GWMA Process

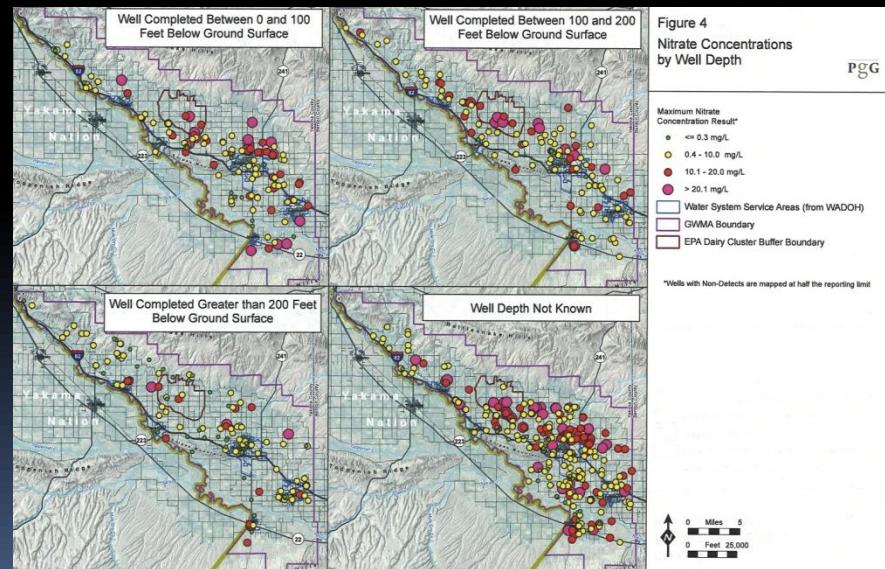
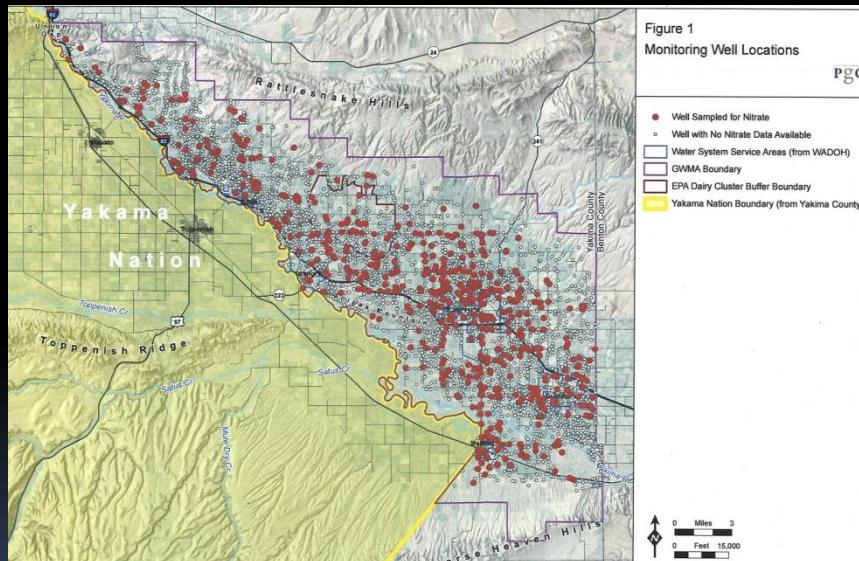


## *GWMA Projects and GWMA Program* *Site Specific GW Monitoring*

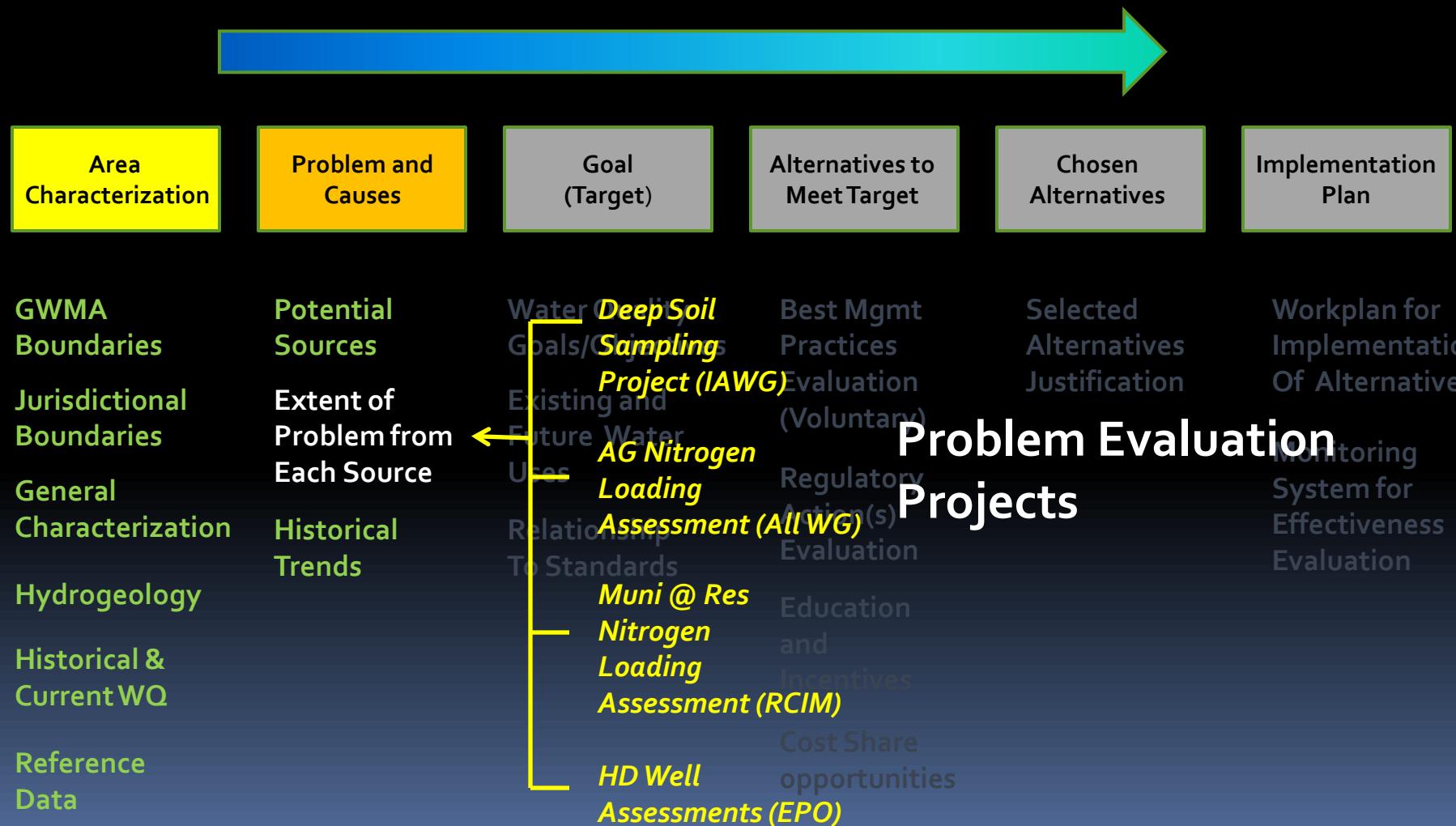


# GWMA Projects and GWMA Program

## Basinwide Groundwater Monitoring Assessment



# GWMA Process

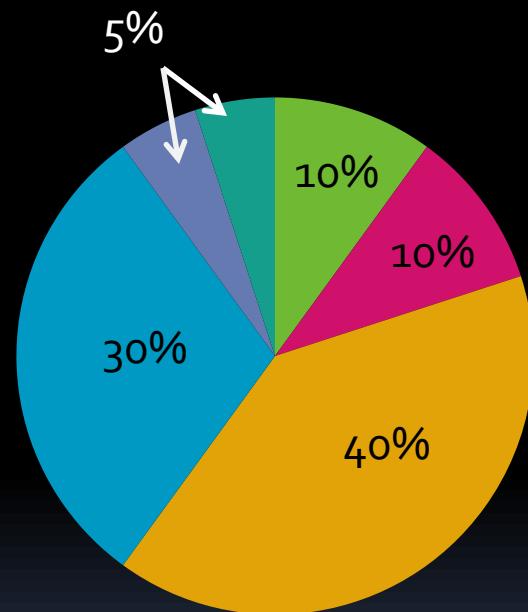


## Extent of Problem from Each Source



Before Assessments

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



After Assessments

*for demonstration purposes only*

## Achievements of Evaluation Projects

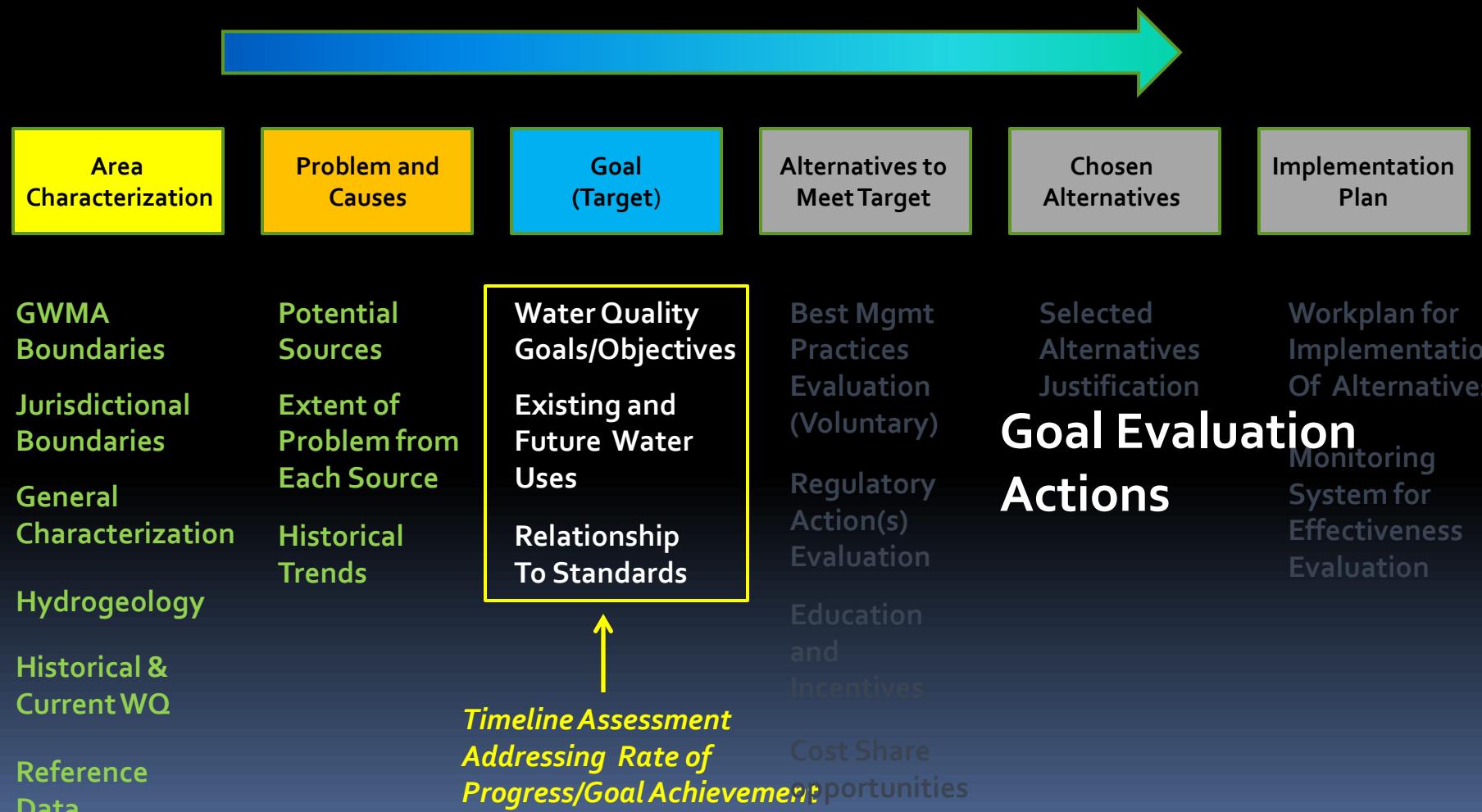
*Relative nitrate contributions to GW from major land uses quantified allow for management focus in critical areas/activities*

*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*

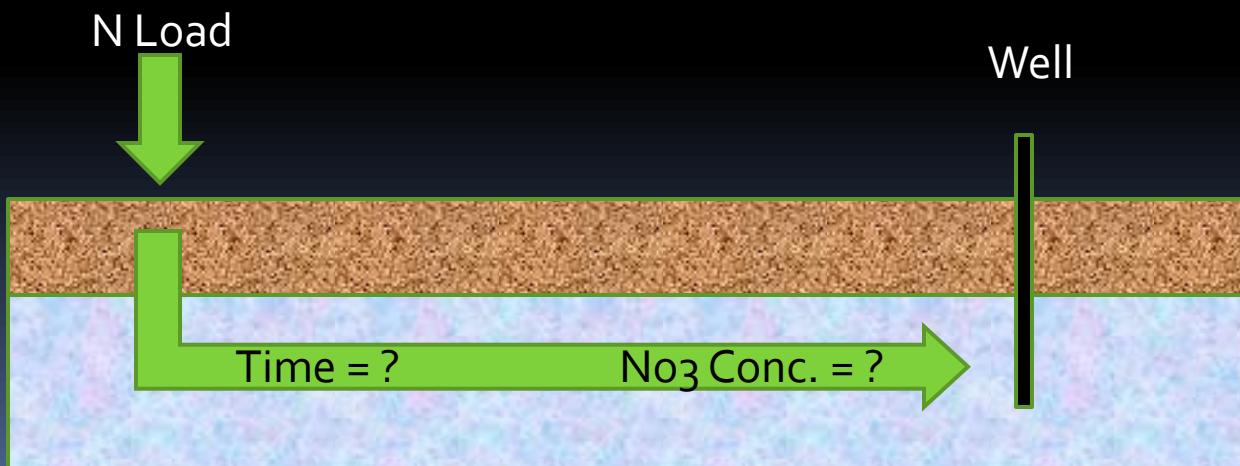
# GWMA Process



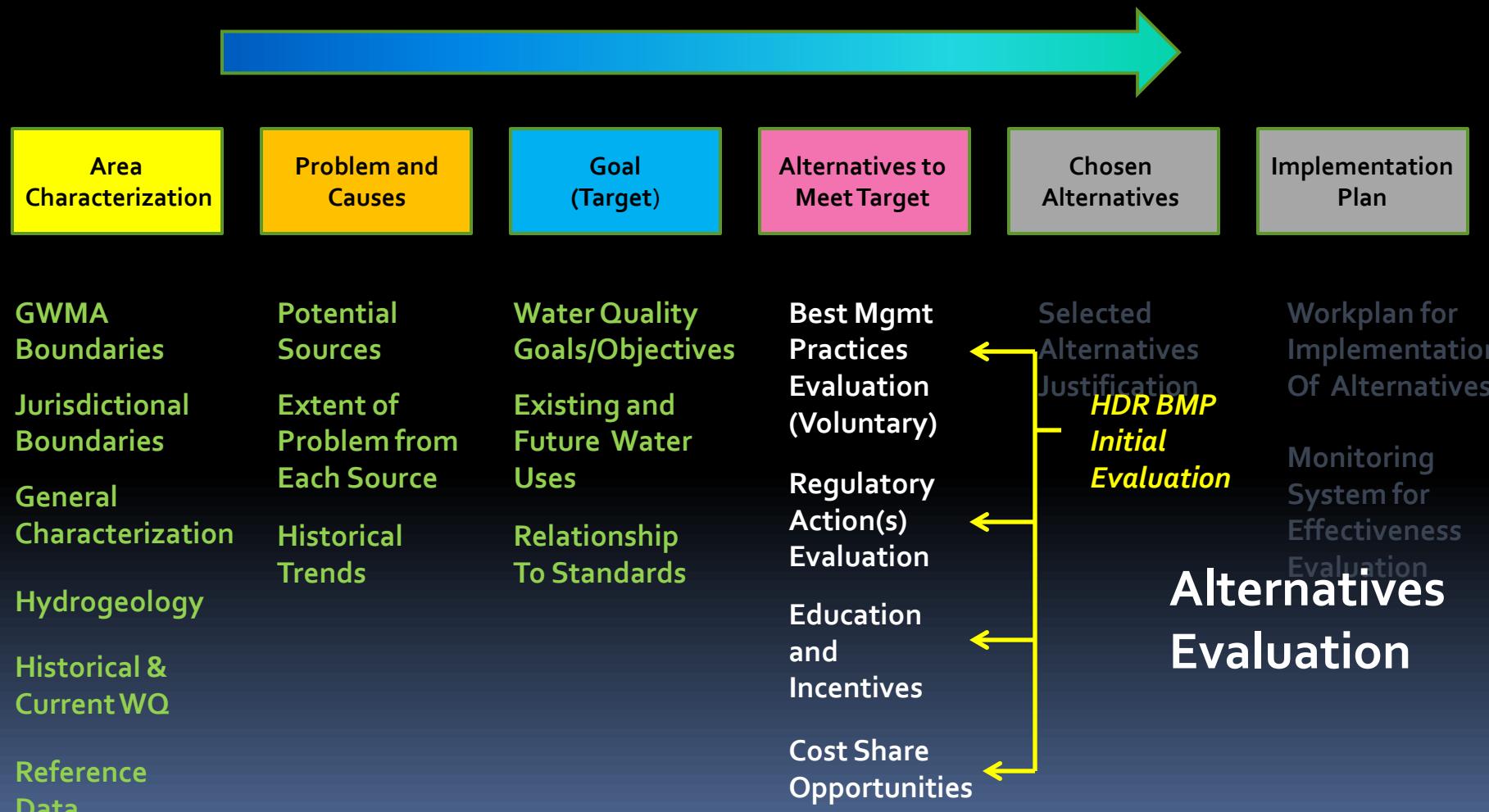
## Goal Evaluation Actions

*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



GWMA Boundaries	Potential Sources	Water Quality Goals/Objectives	Best Mgmt Practices Evaluation (Voluntary)	Selected Alternatives Justification	Workplan for Implementation Of Alternatives
Jurisdictional Boundaries	Extent of Problem from Each Source	Existing and Future Water Uses	Regulatory Action(s) Evaluation		Monitoring System for Effectiveness Evaluation
General Characterization	Historical Trends	Relationship To Standards	Education and Incentives		
Hydrogeology			Cost Share opportunities		
Historical & Current WQ					
Reference Data					

## Alternatives Justification

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

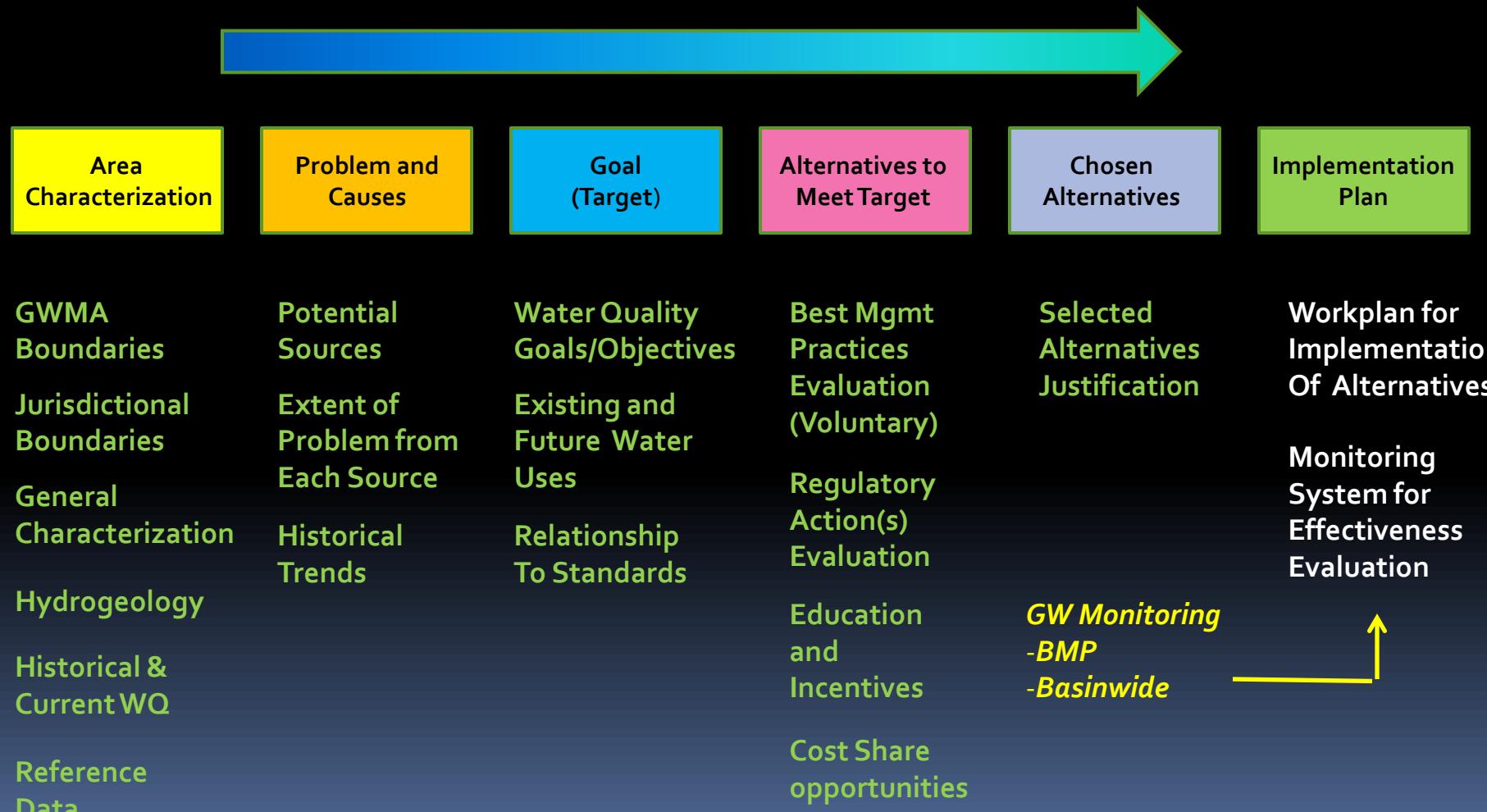
*Selected alternatives should be based on local needs and goals*

*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:*

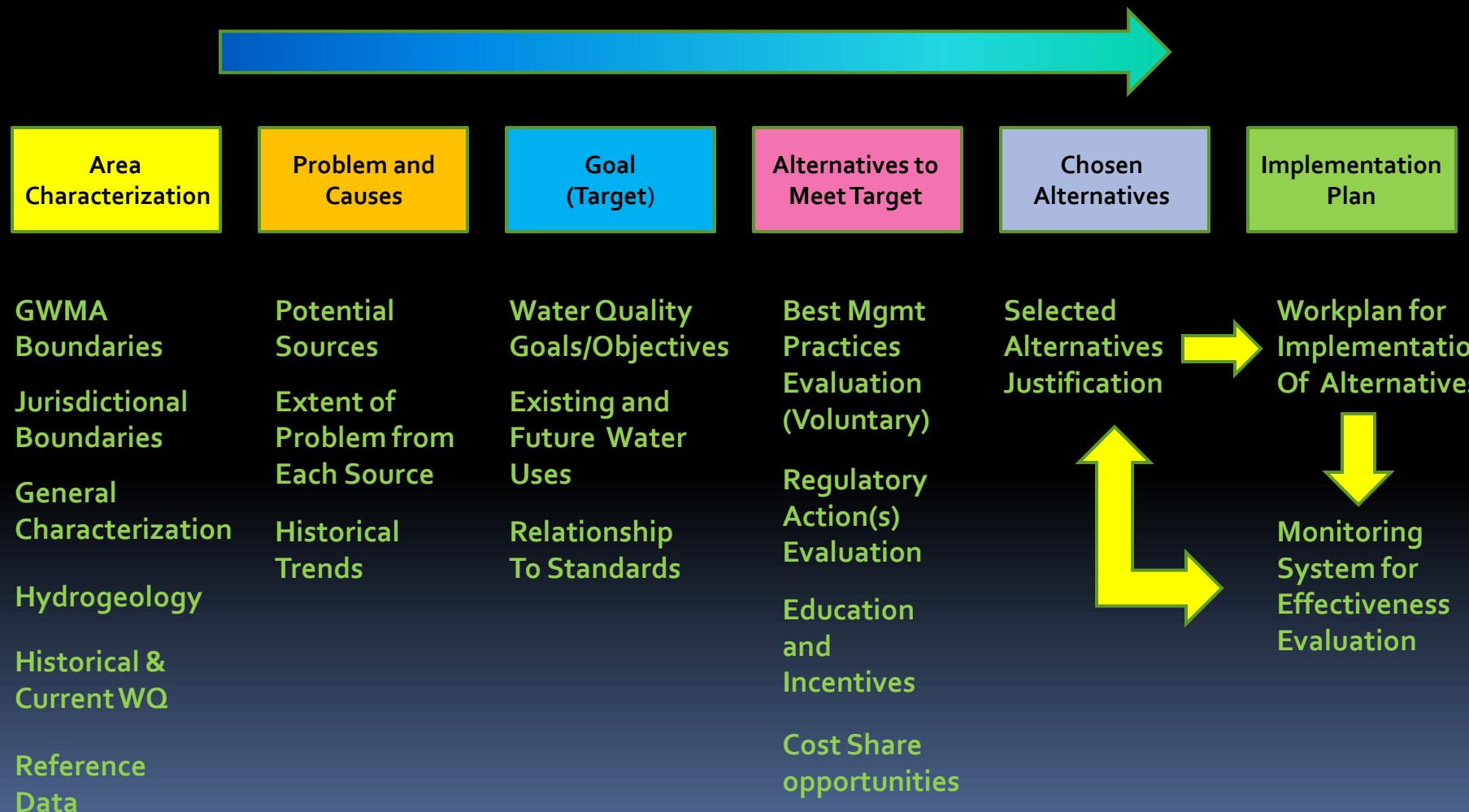
*Overall progress of changes to land use management actions recommended by implementation plan*

*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

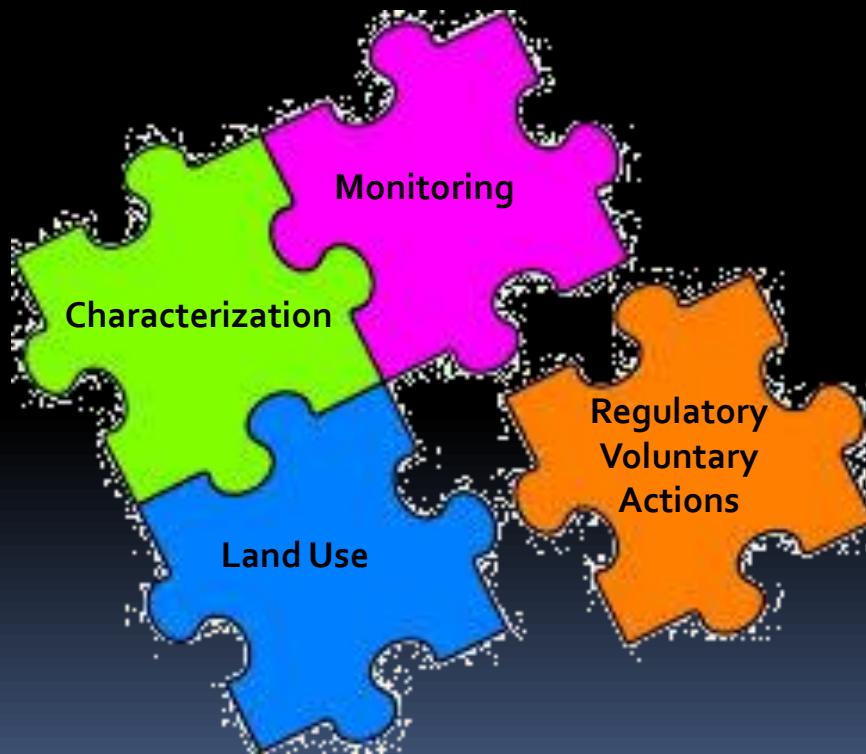
*Quantifying the amount of nitrogen (nitrate) leaching into underlying groundwater is key to understanding how well current management actions are working to limit excess nitrogen*

*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?