# Irrigation Protection in CBM Areas



#### **WYOMING**

ASMR Annual Conference Laramie, WY June 5, 2013

## Wyoming Ag Protection Standard

## Chapter 1, Section 20; Wyoming Water Quality Rules and Regulations:

"All Wyoming surface waters which have the natural water quality potential for use as an agricultural water supply shall be maintained at a quality which allows continued use of such waters for agricultural purposes.

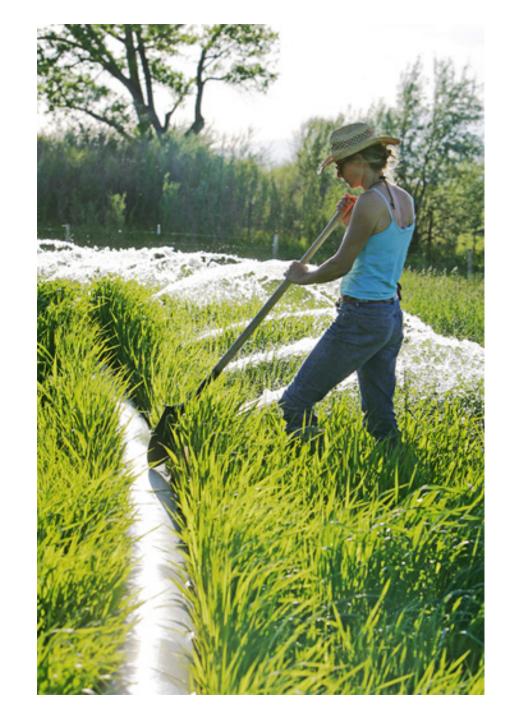
Degradation of such waters shall not be of such an extent to cause a measurable decrease in crop or livestock production.

Unless otherwise demonstrated, all Wyoming surface waters have the natural water quality potential for use as an agricultural water supply."

# What We're NOT talking about....







# What We ARE talking about....





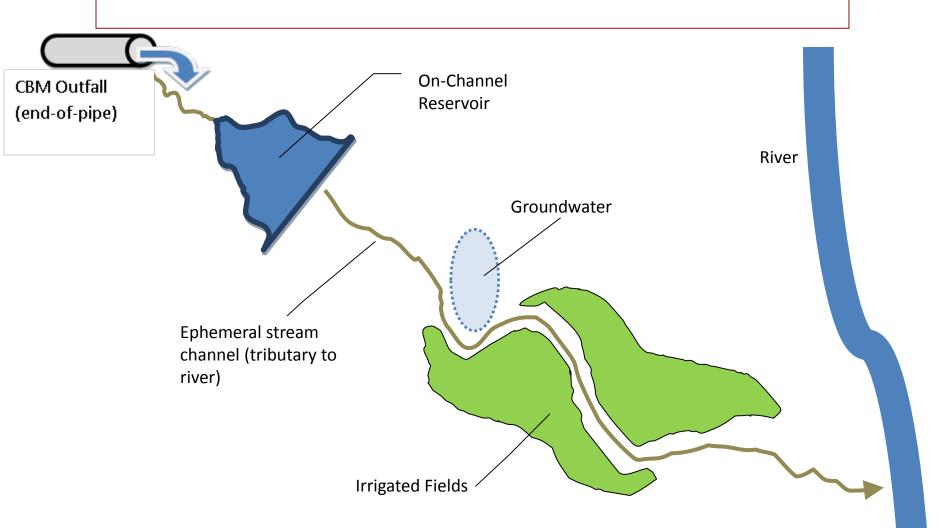




### What Gets Monitored

- CBM Outfalls (Produced Water)
- CBM Reservoirs
- Surface Water (Downstream)
- Groundwater
- Soils
- Crops / Forage

#### **Typical CBM Layout**



## <u>Reservoirs</u>

Threshold: Reservoir water EC concentrating salts at 150% or greater.

Action: Cease discharge of CBM water into affected reservoirs.

## <u>Groundwater</u>

Threshold 1: Groundwater within 6 feet of surface.

**Action 1:** Increase sampling frequency. Add sampling for dissolved inorganic carbon.

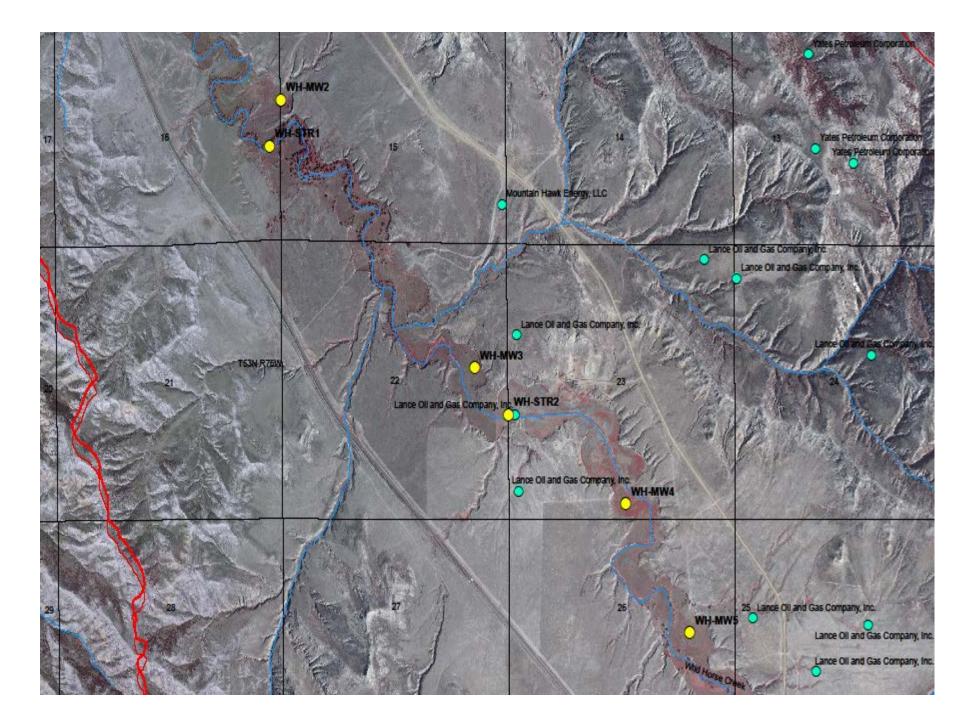
**Threshold 2:** Groundwater within 3 feet of surface AND contains CBM water.

**Action 2:** Cease CBM flows from contributing areas.

## <u>Soils</u>

- Threshold: 40% increase in EC or SAR in one year; or 15% increase over 2 years or more; or, regardless of trend, any finding of ESP > 10% or EC > 4,000 micromhos/cm at 0-12" depth.
- Action: Increase soil sampling to twice per year.
   Investigate source of problem. If CBM water a contributing factor, mitigate by reducing CBM discharges, improving drainage and/or amending soils.

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### 2012 Dead Horse Creek:

**Depth to groundwater:** 3.5 - 12.5 ft

**Groundwater EC:** 3,000 – 12,000 μmhos/cm

Groundwater Carbon  $C^{13}/C^{12}$ : -4.5 to -12.5

**Soil EC:**  $4,000 - 17,000 \mu mhos/cm$ 

**Soil ESP:** 1 - 20

Soil Smectite: 18 - 32 %

Reservoir EC:  $550 - 5,300 \mu mhos/cm$ 

### 2012 Beaver Creek:

**Depth to groundwater:** 6 - 12.5 ft

**Groundwater EC:** 7,200 – 8,300 μmhos/cm

Groundwater Carbon  $C^{13}/C^{12}$ : -4.5 to -14.5

**Soil EC:**  $1,300 - 32,000 \mu mhos/cm$ 

**Soil ESP:** 1 - 20

Soil Smectite: 18 - 41 %

Reservoir EC:  $800 - 3,600 \mu mhos/cm$