Division of
WATER RESOURCES

# Humboldt River

**Lovelock**
**& Winnemucca**
**January 14, 2015**

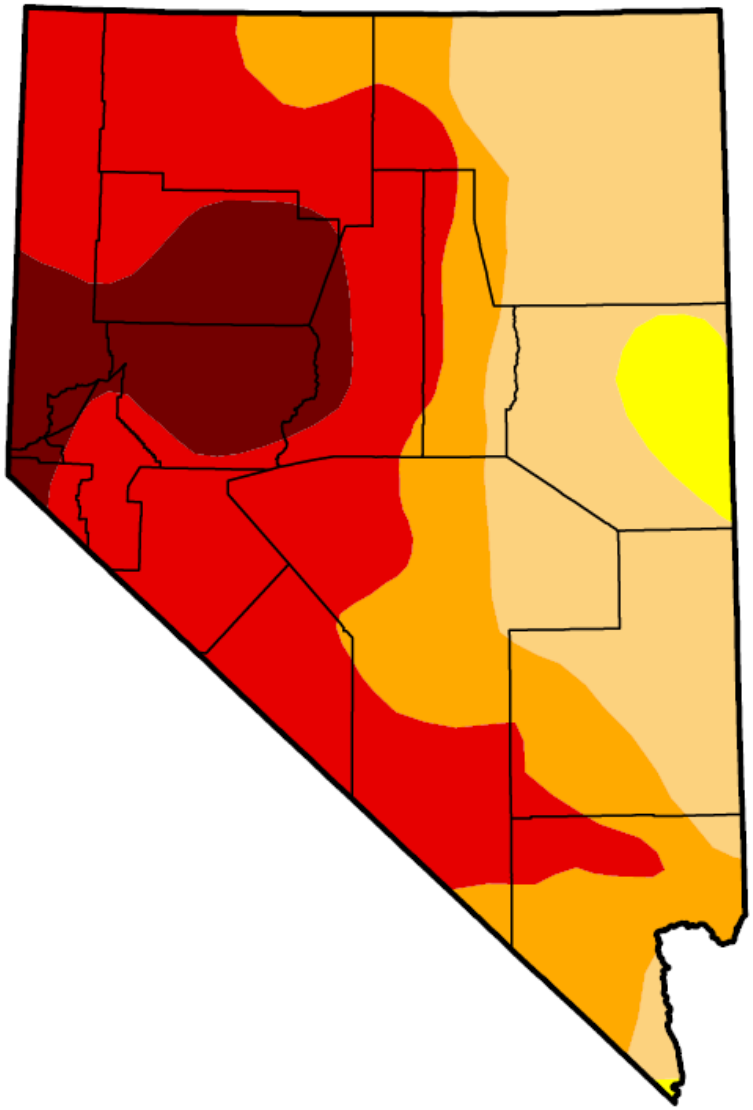
**Elko**
**January 15, 2015**

DEPARTMENT OF
CONSERVATION &
NATURAL RESOURCES

# Topics

- Drought Monitor and Precipitation and Temperature Outlook
- Current stream flows and Rye Patch Reservoir Storage
- Stream flow forecast
- Q&A with Water Commissioners Kirk Owsley and Steve DelSoldato
- Capture Model Update
- In-House Capture Analysis
  - Methodology
  - Results
- Concluding Remarks
- Next Meeting
- Open Discussion

# U.S. Drought Monitor
# Nevada



## January 6, 2015
***(Released Thursday, Jan. 8, 2015)***
**Valid 7 a.m. EST**

*Drought Conditions (Percent Area)*

| | None | D0-D4 | D1-D4 | D2-D4 | D3-D4 | D4 |
|---|---|---|---|---|---|---|
| **Current** | 0.00 | 100.00 | 96.98 | 68.25 | 48.38 | 11.89 |
| **Last Week** *12/30/2014* | 0.00 | 100.00 | 96.98 | 68.25 | 48.38 | 11.89 |
| **3 Months Ago** *10/7/2014* | 0.00 | 100.00 | 97.07 | 69.89 | 48.38 | 11.89 |
| **Start of Calendar Year** *12/30/2014* | 0.00 | 100.00 | 96.98 | 68.25 | 48.38 | 11.89 |
| **Start of Water Year** *9/30/2014* | 0.00 | 100.00 | 97.04 | 69.89 | 48.38 | 11.89 |
| **One Year Ago** *1/7/2014* | 0.00 | 100.00 | 96.81 | 80.30 | 28.55 | 5.37 |

***Intensity:***

- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

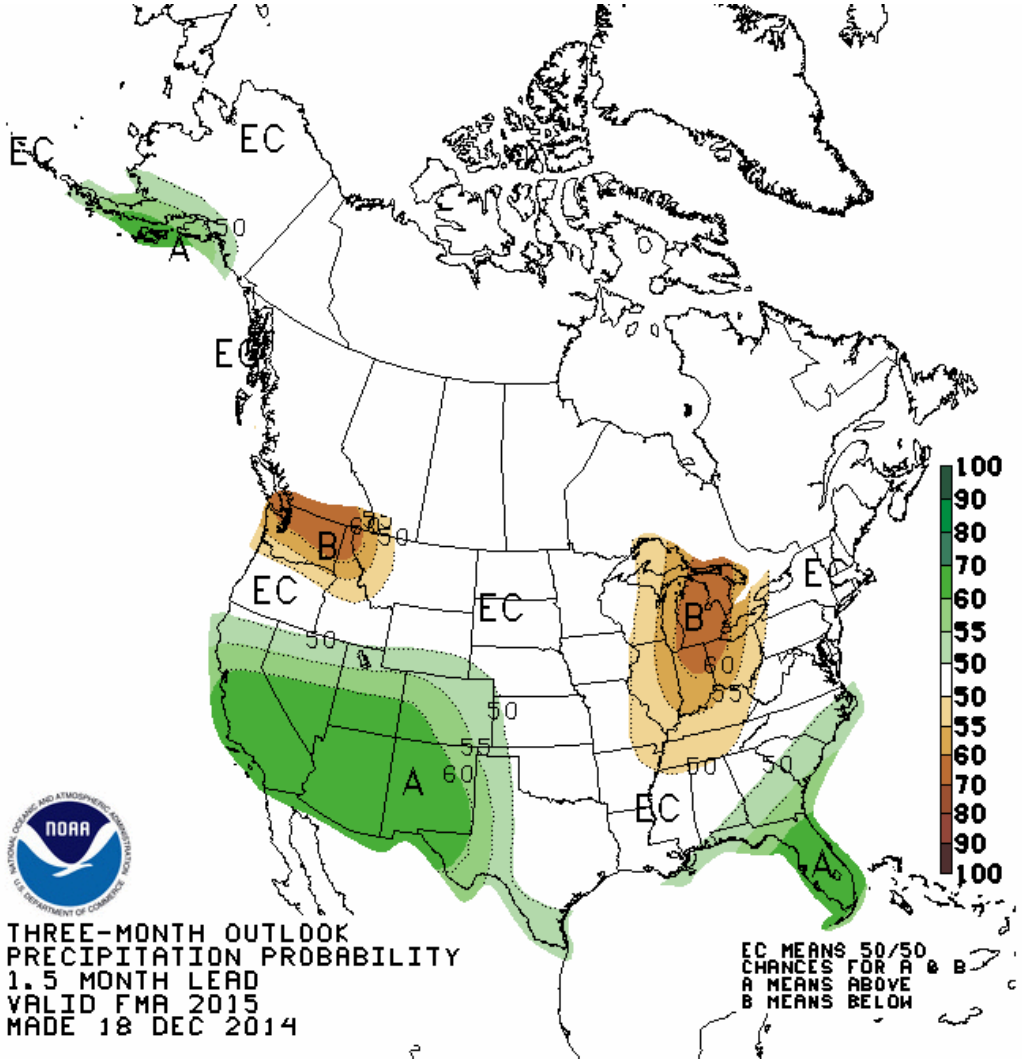
*The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.*

**Author:**
*Brad Rippey*
*U.S. Department of Agriculture*

http://droughtmonitor.unl.edu/

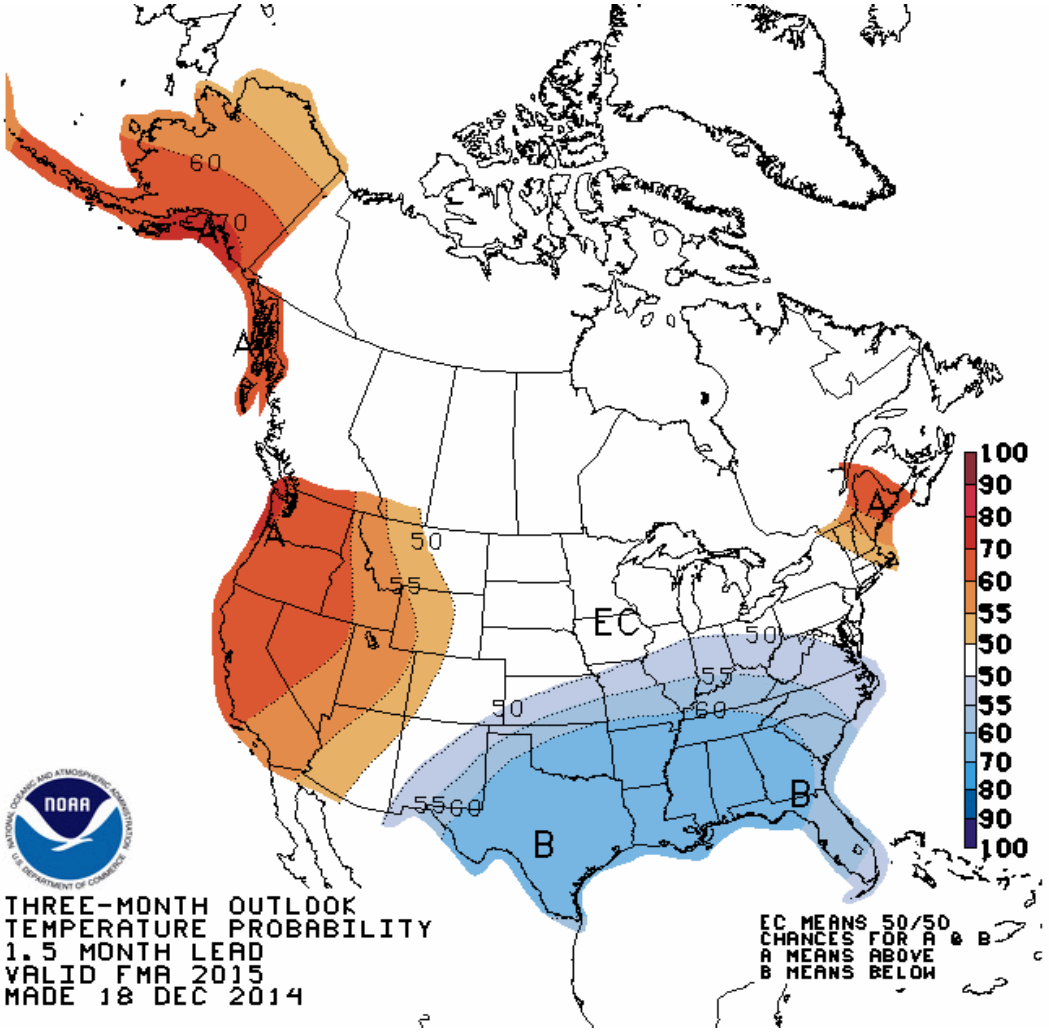
# Spring 2015 (Feb-Apr) Precipitation Outlook

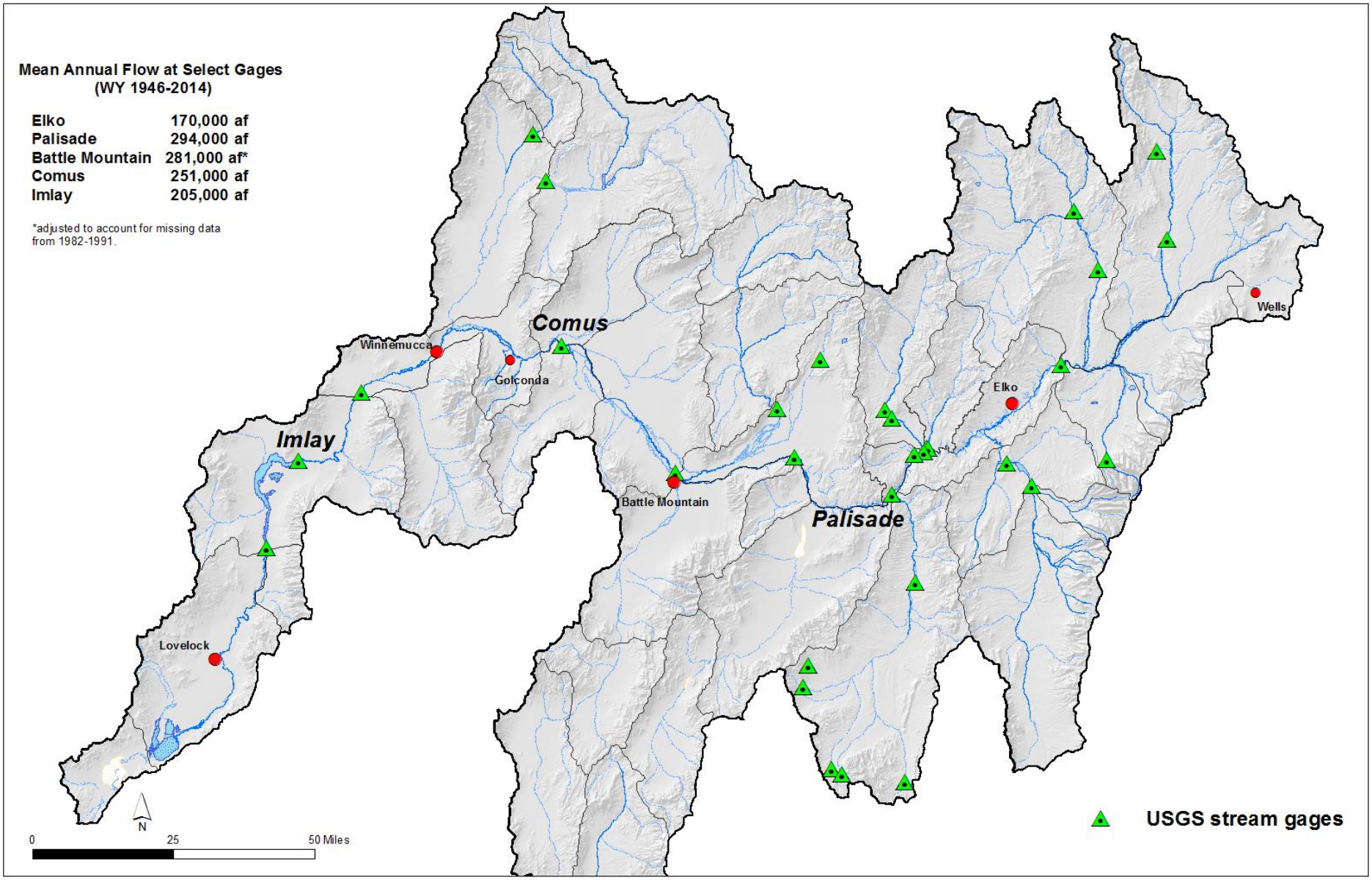
- Official outlook – favoring above normal precipitation overall; medium confidence



# Spring 2015 (Feb-Apr) Temperature Outlook

Temperature – favors continued above normal with medium to high confidence (higher than average snow levels).




Mean Annual Flow at Select Gages
(WY 1946-2014)
Elko 170,000 af
Palisade 294,000 af
Battle Mountain 281,000 af*
Comus 251,000 af
Imlay 205,000 af
*adjusted to account for missing data from 1982-1991.
Comus
Winnemucca
Golconda
Imlay
Battle Mountain
Palisade
Elko
Wells
Lovelock
N
0
25
50 Miles
USGS stream gages

# Current Stream Flows/Rye Patch Storage

http://waterdata.usgs.gov/nv/nwis/current/?type=flow

January 13, 2015

| | Long Term Average Flow (cfs) | Current Discharge (cfs) |
|---|---|---|
| Humboldt River at Palisade | 151 | 110 |
| Humboldt River at Comus | 118 | 22 |
| Humboldt River at Imlay | 108 | 0 |

| | Capacity (KAF) | Current Storage (KAF) |
|---|---|---|
| Rye Patch Reservoir | 194.3 | 9.2 |

# Stream Flow Forecasts for March - July

http://www.nrcs.usda.gov/wps/portal/nrcs/main/nv/snow/waterproducts/forecasts

## Humboldt River at Palisade

| Year | January 1 Forecast (KAF) | % of Average | March 1 Forecast (KAF) | Actual Flow (KAF) | Actual flow as a % of 30-yr average (270) |
|---|---|---|---|---|---|
| 2011 | 460 | 170% | 370 | 471 | 174% |
| 2012 | 114 | 42% | 108 | 58 | 21% |
| 2013 | 235 | 87% | 165 | 35 | 13% |
| 2014 | 65 | 24% | 120 | 57 | 21% |
| 2015 | 230 | 85% | -- | -- | -- |

# Stream Flow Forecasts for March - July

http://www.nrcs.usda.gov/wps/portal/nrcs/main/nv/snow/waterproducts/forecasts

Humboldt River at Comus

| Year | January 1 Forecast (KAF) | % of Average | March 1 Forecast (KAF) | Actual Flow (KAF) | Actual flow as a % of 30-yr average (255) |
|---|---|---|---|---|---|
| 2011 | 410 | 161% | 320 | 337 | 132% |
| 2012 | 75 | 29% | 67 | 45 | 18% |
| 2013 | 200 | 78% | 115 | 20 | 8% |
| 2014 | 48 | 19% | 59 | 32 | 13% |
| 2015 | 185 | 73% | -- | -- | -- |

# Stream Flow Forecasts for March - July

http://www.nrcs.usda.gov/wps/portal/nrcs/main/nv/snow/waterproducts/forecasts

## Humboldt River near Imlay

| Year | January 1 Forecast (KAF) | % of Average | March 1 Forecast (KAF) | Actual Flow (KAF) | Actual flow as a % of 30-yr average (222) |
|---|---|---|---|---|---|
| 2011 | 355 | 160% | 240 | 234 | 105% |
| 2012 | 56 | 25% | 40 | 24 | 11% |
| 2013 | 160 | 72% | 75 | 7 | 3% |
| 2014 | 20 | 9% | 24 | 5 | 2% |
| 2015 | 140 | 63% | -- | -- | -- |

# Water Commissioner Discussion

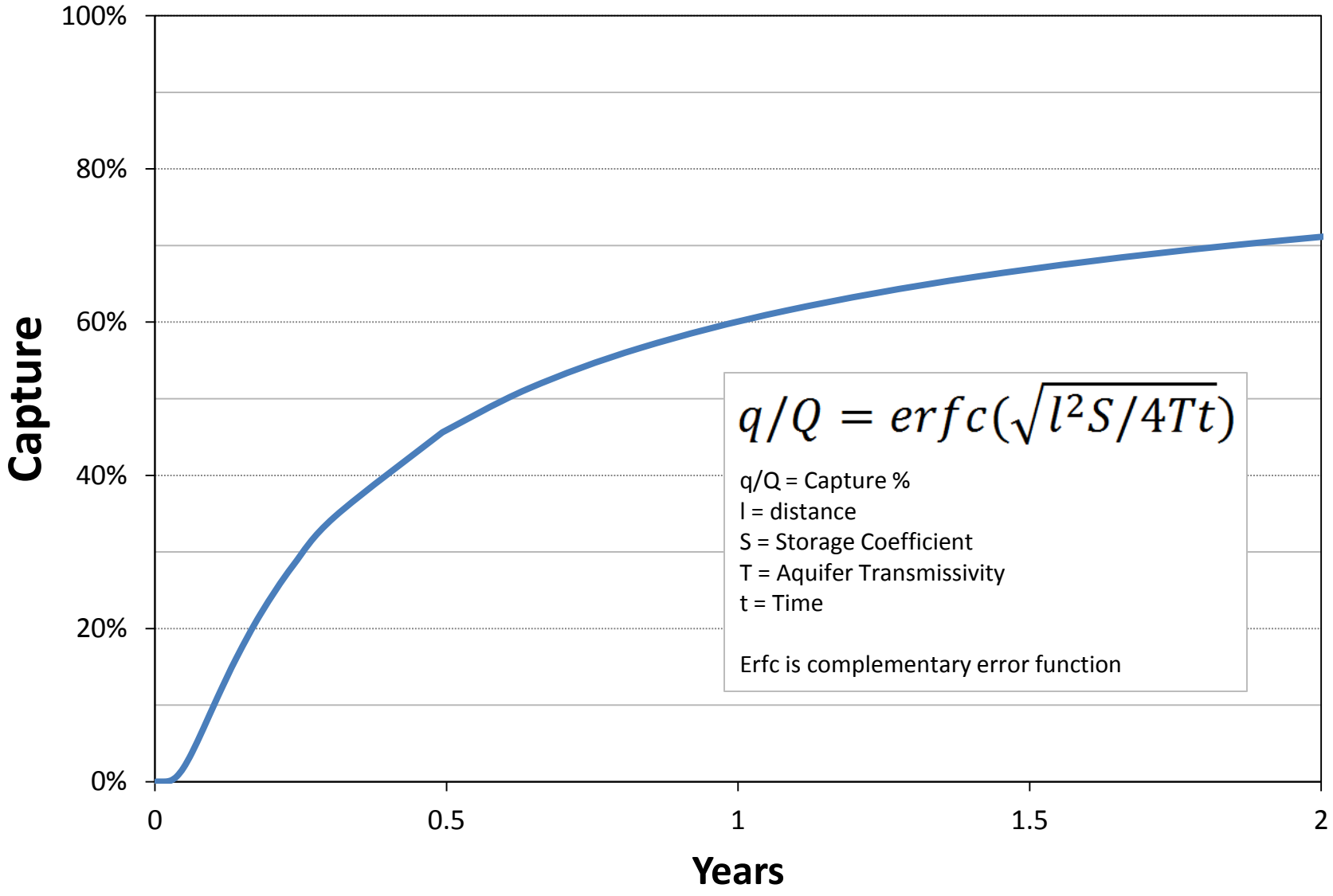
# Capture Model Update

- In discussions with USGS and DRI
- Groundwater flow model to evaluate interaction between river and aquifer
- Uses existing data to ensure accuracy of model
- Looks at long term scenarios
- Final product includes estimate of river capture by groundwater wells over time
- Will be used in future management actions
- Estimated time to completion: 5 years

# In-House Capture Analysis

- Objectives
  - Evaluate potential to increase 2015 streamflow by curtailing existing pumping
  - Evaluate effectiveness of different UG curtailment scenarios
- Glover Analytical solution
  - Commonly used in administering water rights to protect streamflows
  - Requires simplifying assumptions about aquifer and stream-aquifer connection
- Requires
  - Aquifer parameters: Transmissivity, Storativity
  - Distances between wells and stream
  - Pumping duration (irrigation season)
  - Pumping rates (typical pumping during drought; used 2013 pumpage data)

# GLOVER'S SOLUTION



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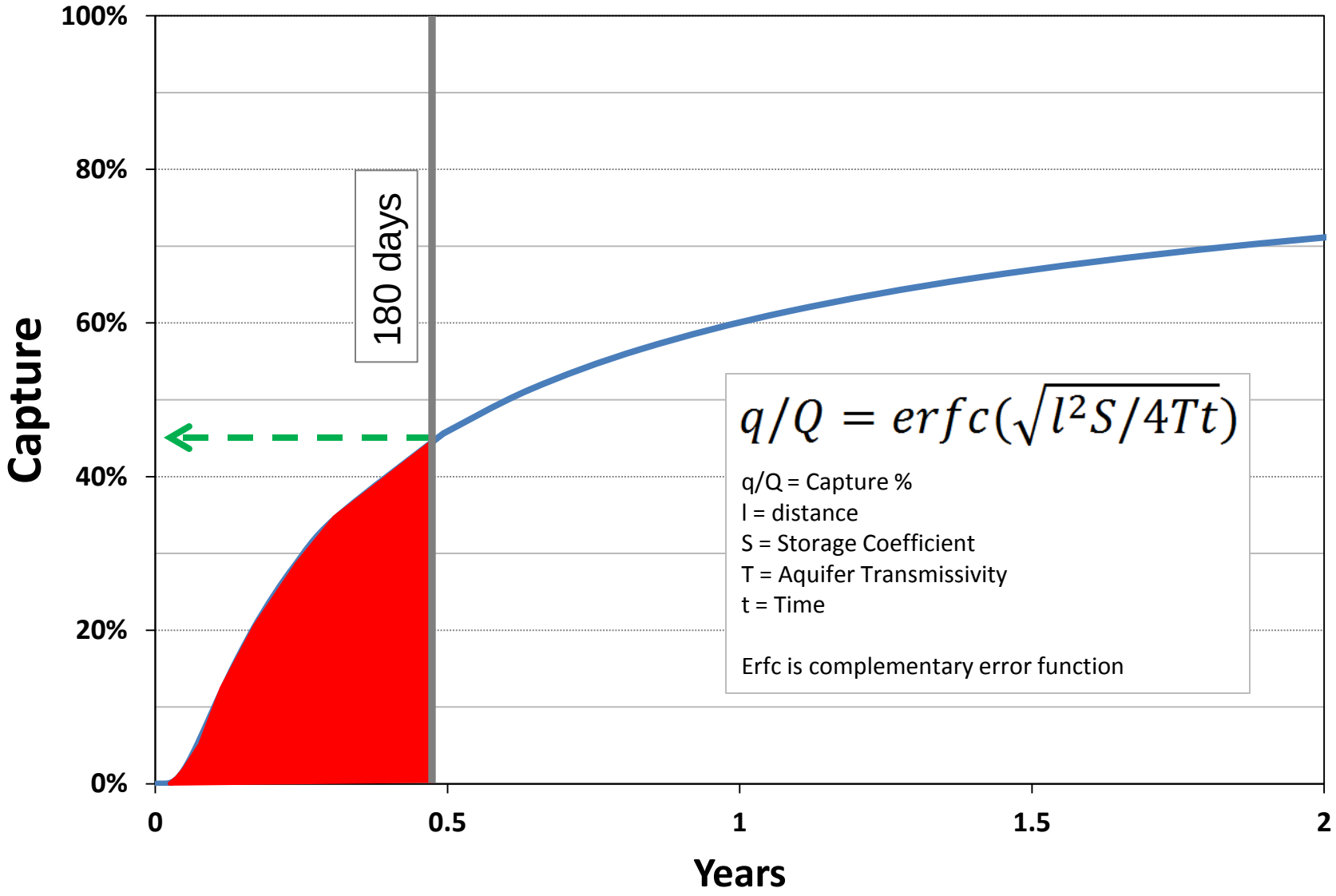
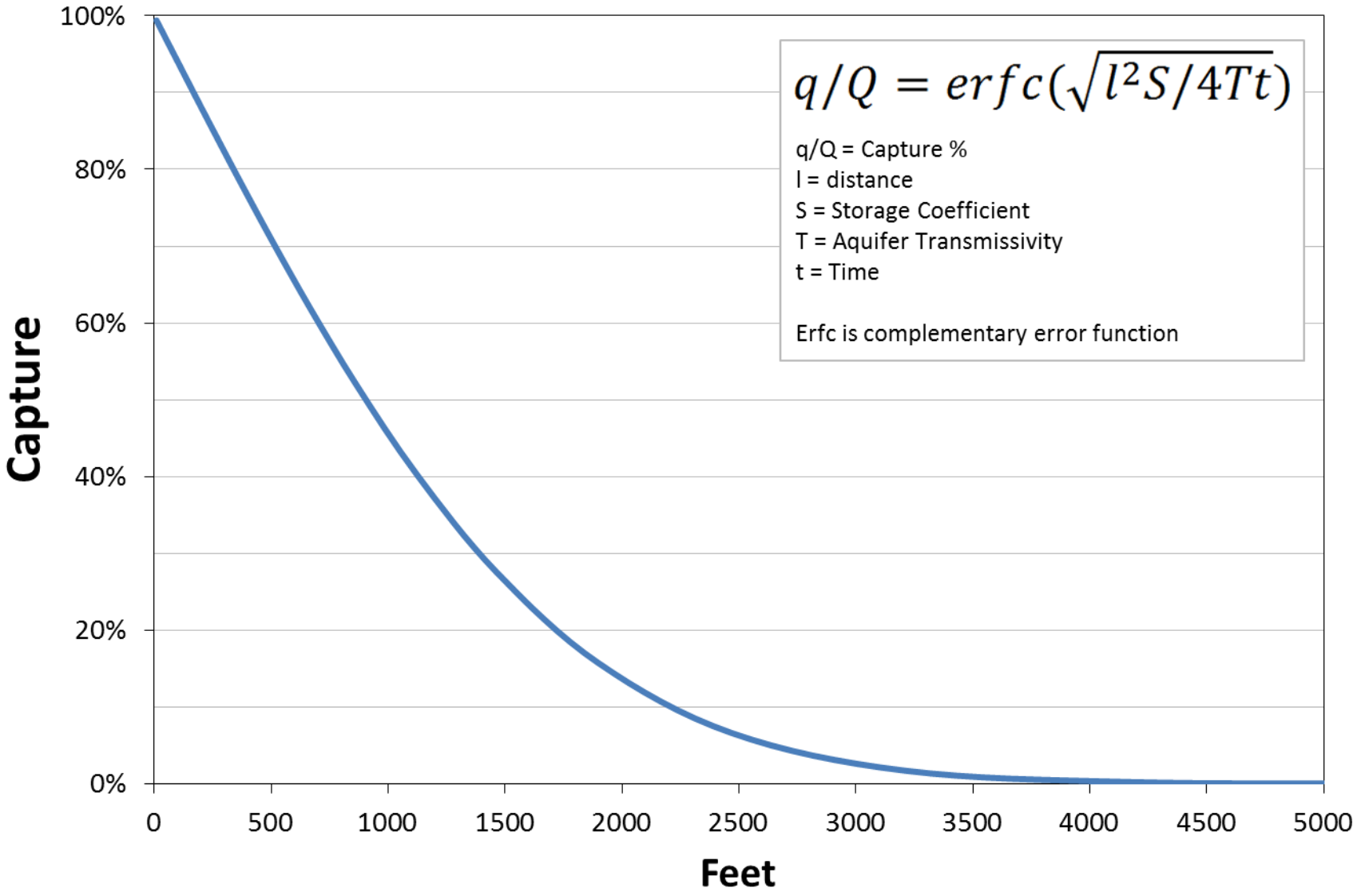
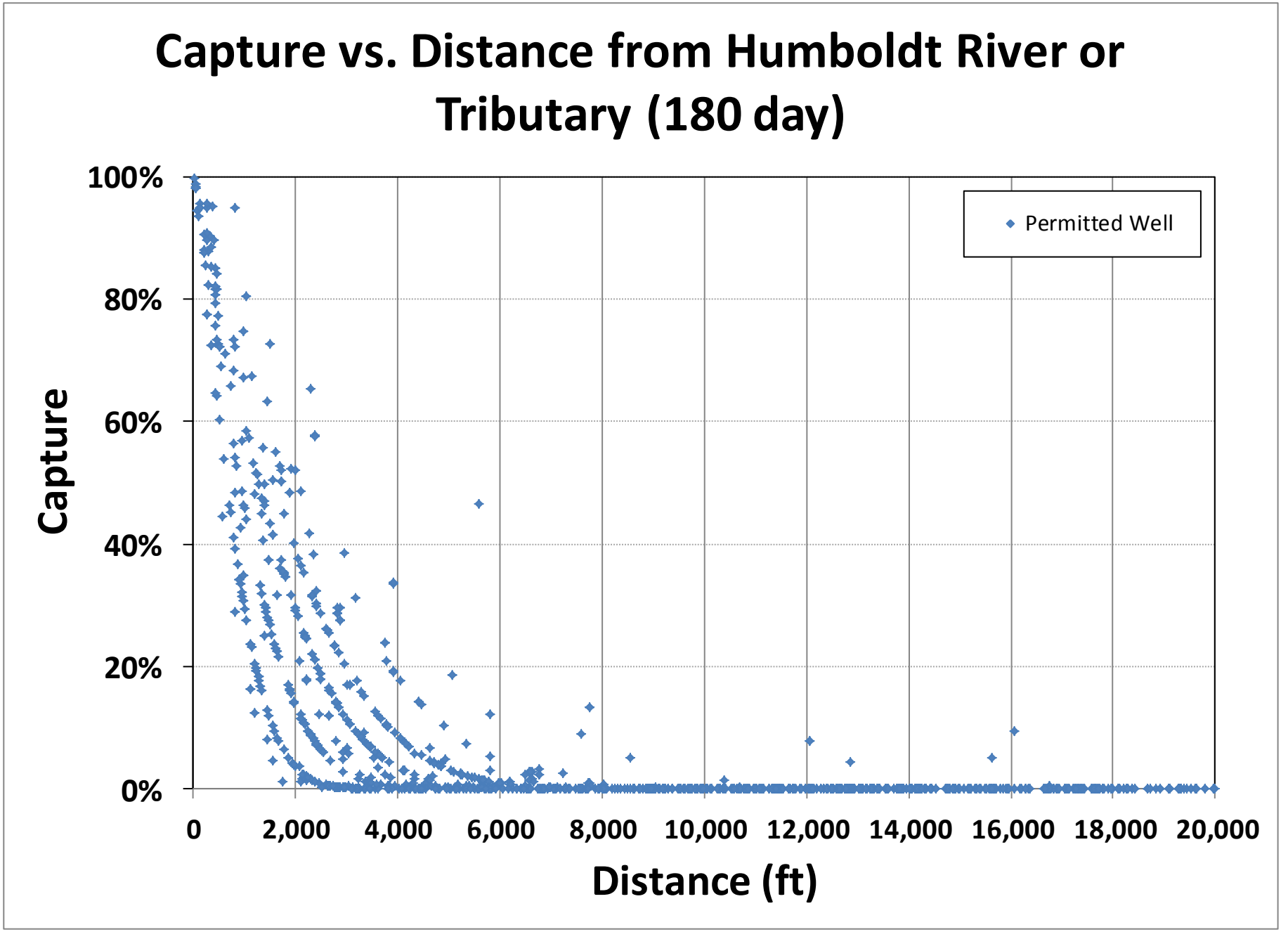
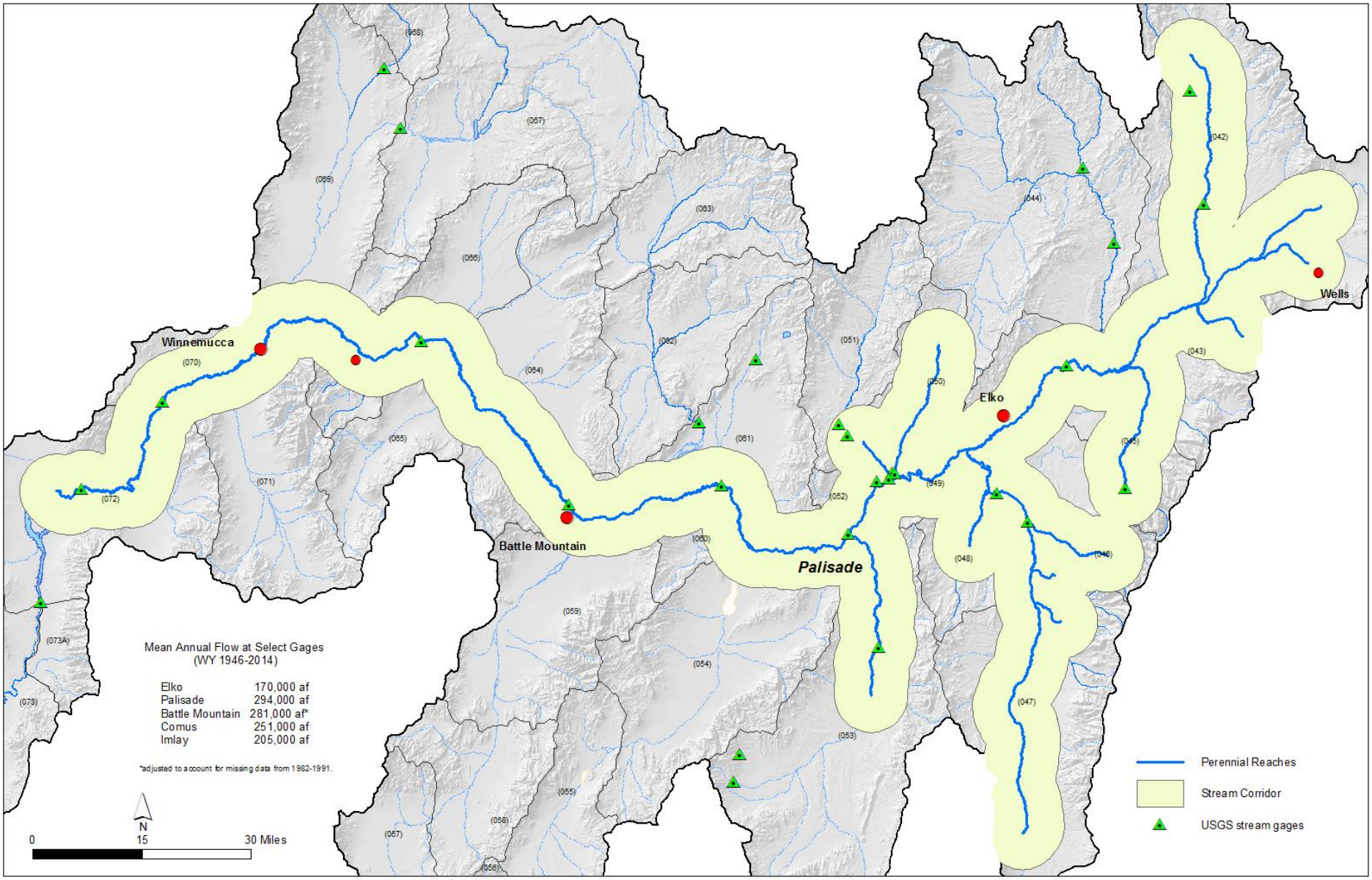
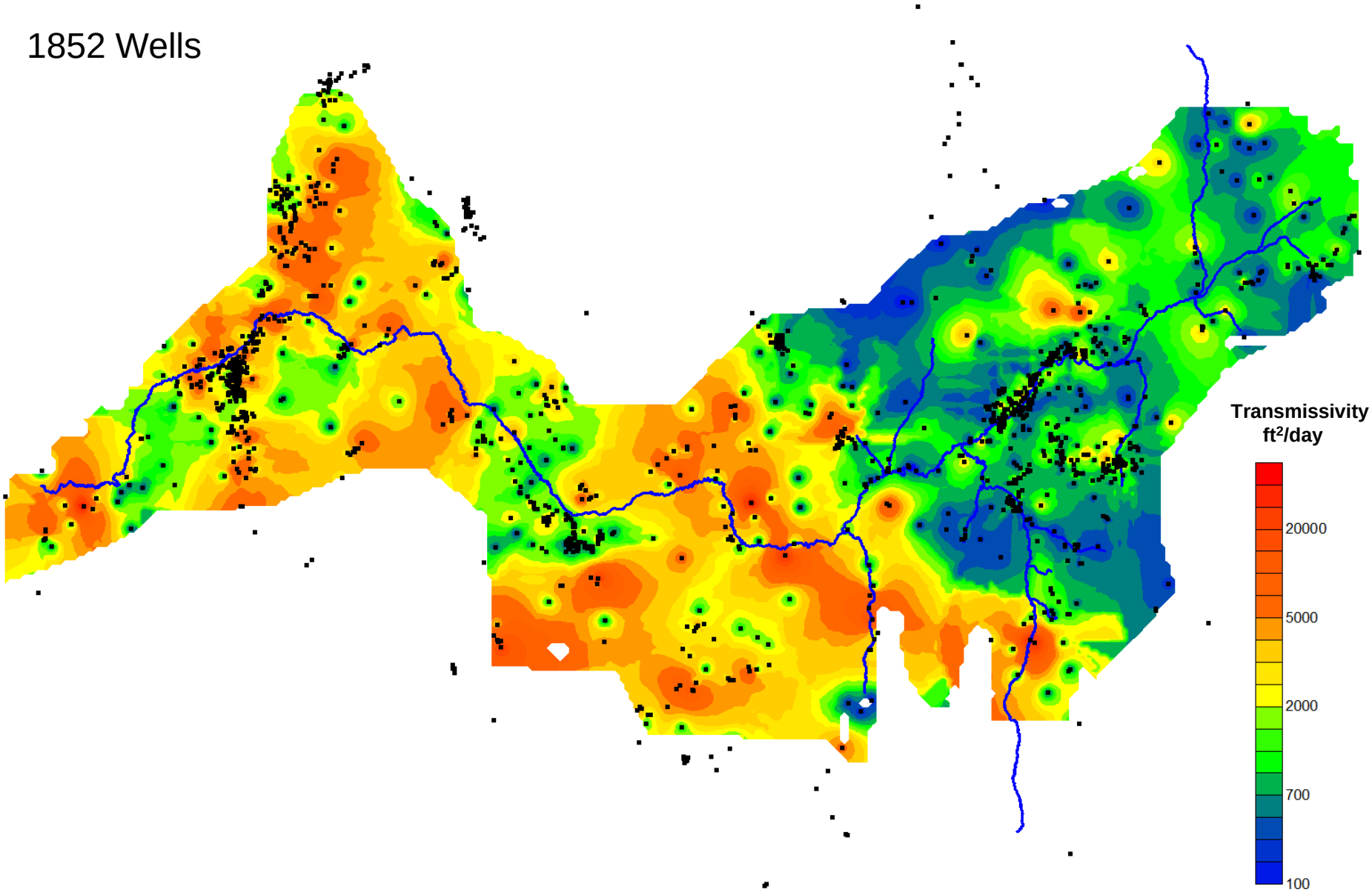


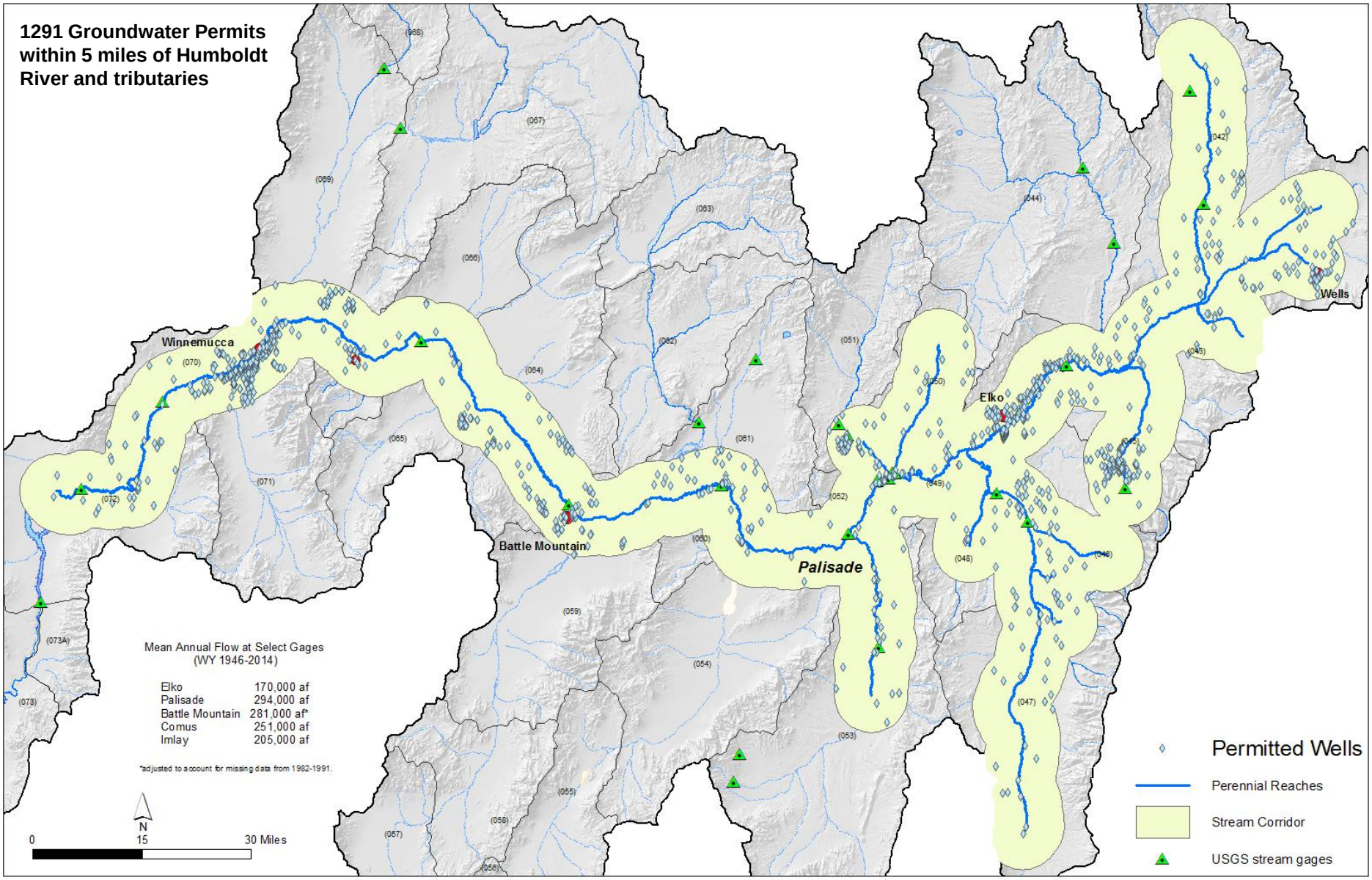
# GLOVER'S SOLUTION

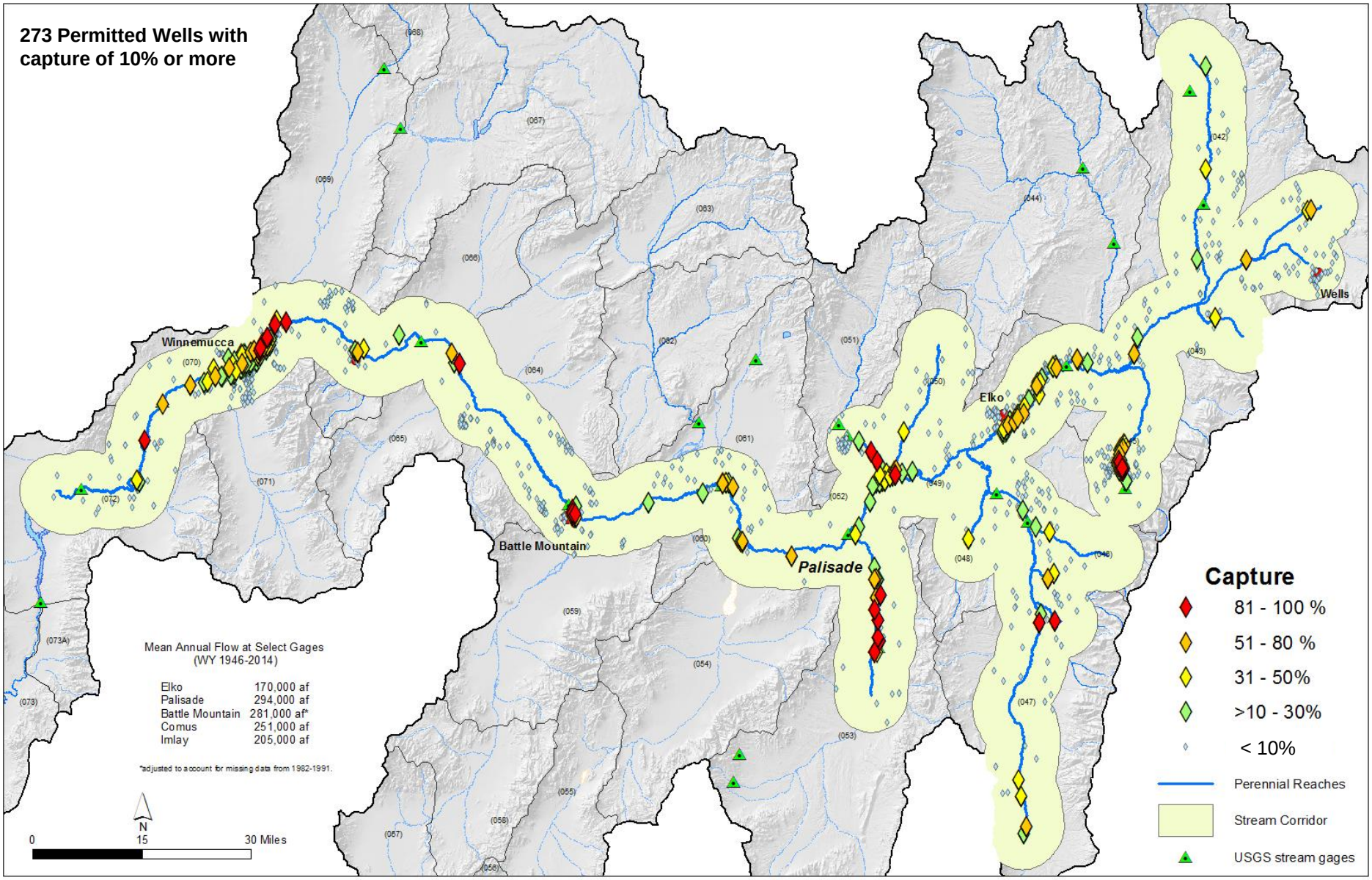



Capture vs. Distance from Humboldt River or Tributary (180 day)
Capture
100%
80%
60%
40%
20%
0%
0
2,000
4,000
6,000
8,000
10,000
12,000
14,000
16,000
18,000
20,000
Distance (ft)
Permitted Well


Winnemucca
Battle Mountain
Palisade
Elko
Wells
(068)
(067)
(099)
(063)
(066)
(042)
(044)
(082)
(051)
(043)
(070)
(064)
(050)
(065)
(061)
(045)
(071)
(049)
(072)
(052)
(060)
(048)
(046)
(059)
(073A)
(054)
(073)
(047)
(053)
(055)
(058)
(057)
(056)
Mean Annual Flow at Select Gages
(WY 1946-2014)
Elko 170,000 af
Palisade 294,000 af
Battle Mountain 281,000 af*
Comus 251,000 af
Imlay 205,000 af
*adjusted to account for missing data from 1982-1991.
N
0
15
30 Miles
Perennial Reaches
Stream Corridor
USGS stream gages


1852 Wells
Transmissivity
ft²/day
20000
5000
2000
700
100


1291 Groundwater Permits within 5 miles of Humboldt River and tributaries
Winnemucca
Battle Mountain
Palisade
Elko
Wells
Mean Annual Flow at Select Gages (WY 1946-2014)
Elko 170,000 af
Palisade 294,000 af
Battle Mountain 281,000 af*
Comus 251,000 af
Imlay 205,000 af
*adjusted to account for missing data from 1982-1991.
N
0
15
30 Miles
Permitted Wells
Perennial Reaches
Stream Corridor
USGS stream gages


273 Permitted Wells with capture of 10% or more
Winnemucca
Battle Mountain
Palisade
Elko
Wells
Mean Annual Flow at Select Gages (WY 1946-2014)
Elko 170,000 af
Palisade 294,000 af
Battle Mountain 281,000 af*
Comus 251,000 af
Imlay 205,000 af
*adjusted to account for missing data from 1982-1991.
N
0
15
30 Miles
Capture
81 - 100 %
51 - 80 %
31 - 50%
>10 - 30%
< 10%
Perennial Reaches
Stream Corridor
USGS stream gages

# Results

| | |
|---|---|
| Total Groundwater ***Duty*** with >10% Capture (AFS) | 37,650 |
| Estimated Groundwater ***Pumping*** during Irrigation Season (AF)* | 7,480 |
| Additional Flow in Humboldt River over 2015 Irrigation Season if all Pumping Ceased (AFS) | 1,480 |

*Based on 2013 records

# Results

- Glover analysis shows that curtailment of pumping over one irrigation season will not cause an appreciable gain in Humboldt River flows

- **Therefore it is anticipated that there will be NO groundwater curtailment in 2015**

# Concluding Remarks

- We’re committed to protecting senior water rights
- Need capture model as a long-term equitable management tool
- Augmentation, mitigation may be required in the future
- Uncharted territory

# Next Meeting

## February 11th and 12th

NRCS Snotel data and Streamflow Forecasts:

www.nv.nrcs.usda.gov/snow/

NWS Climate Forecasts:

www.cpc.ncep.noaa.gov/

United States Drought Monitor:

http://droughtmonitor.unl.edu/Home/StateDroughtMonitor


Questions