Colorado's Methodology for Irrigated Acreage Accounting

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Irrigated Acreage Accounting

- Colorado has mapped irrigated lands for nearly the entire State
- We use this data for modeling, planning and compact reporting
- We produce a Statewide coverage on 5-year increments (05s-10s)
- For some basins we produce an annual dataset (North Platte and Rio Grande)

Attributes Collected

- Crop Type
- Irrigation Method (i.e. Flood, Sprinkler)
- Acres
- Irrigating Surface and Groundwater Structures
- Crop Type Source (Satellite, NASS, Field, Interpolation)
- Calendar Year
- Water Division and District

Data Used in Analysis

- Landsat Satellite Imagery (Landsat 5 and 7)
- Aerial Photography (If Available)
- NASS Cropland Data Layer
- Mapped Irrigated Lands
- Diversion Records

Data Used in Analysis

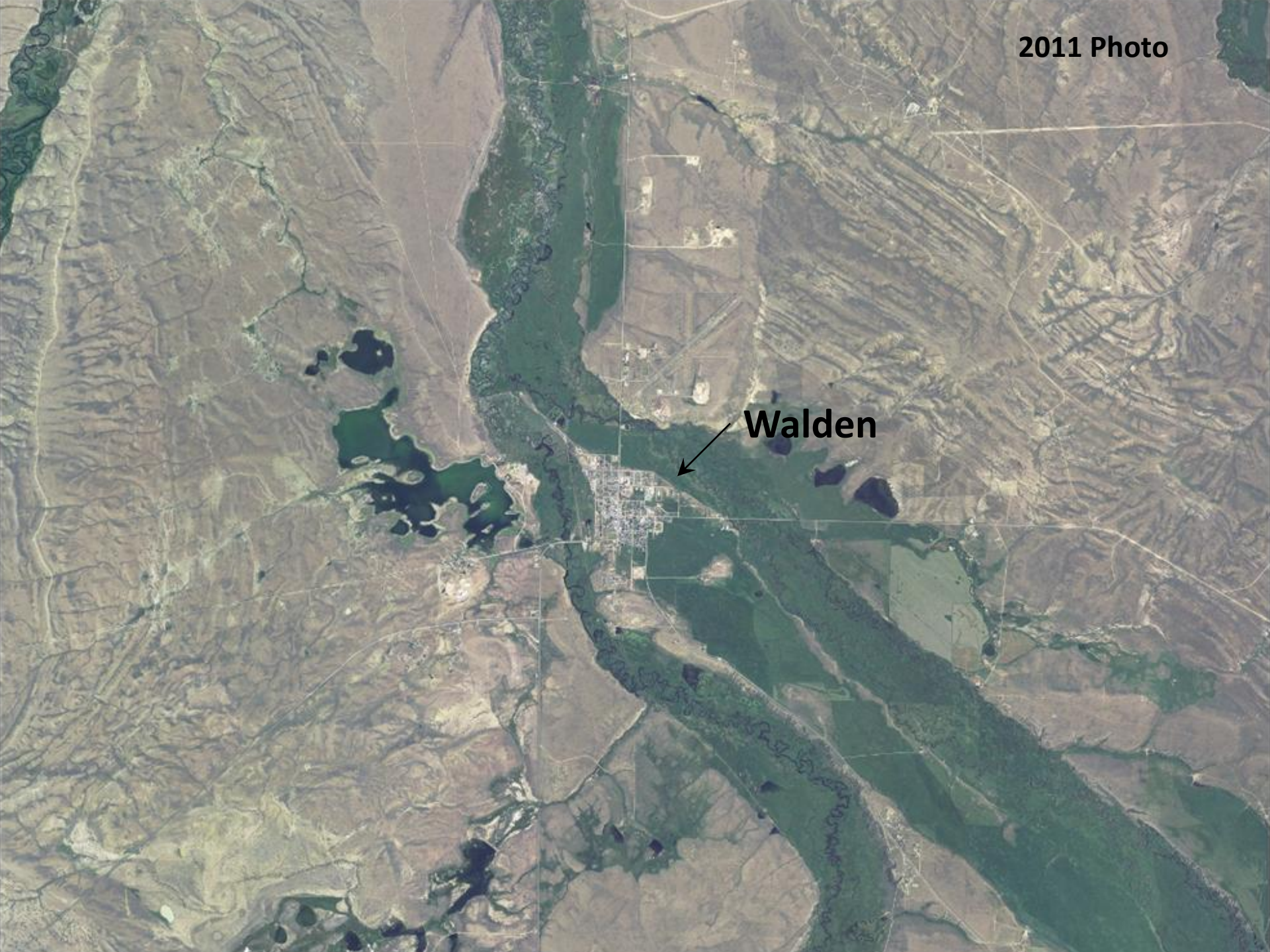
- For the North Platte Valley, we've mapped 126,328 acres of potentially irrigated lands
- This was done by mashing together all the historical irrigated lands data (1956, 1976, 1987, 2001, 2005 and 2010)
- Most of these historic layers were produced by contractors with input from stakeholders
- The resulting master coverage was reviewed by Division 6 staff and revised
- We continue to review and revise the data as necessary

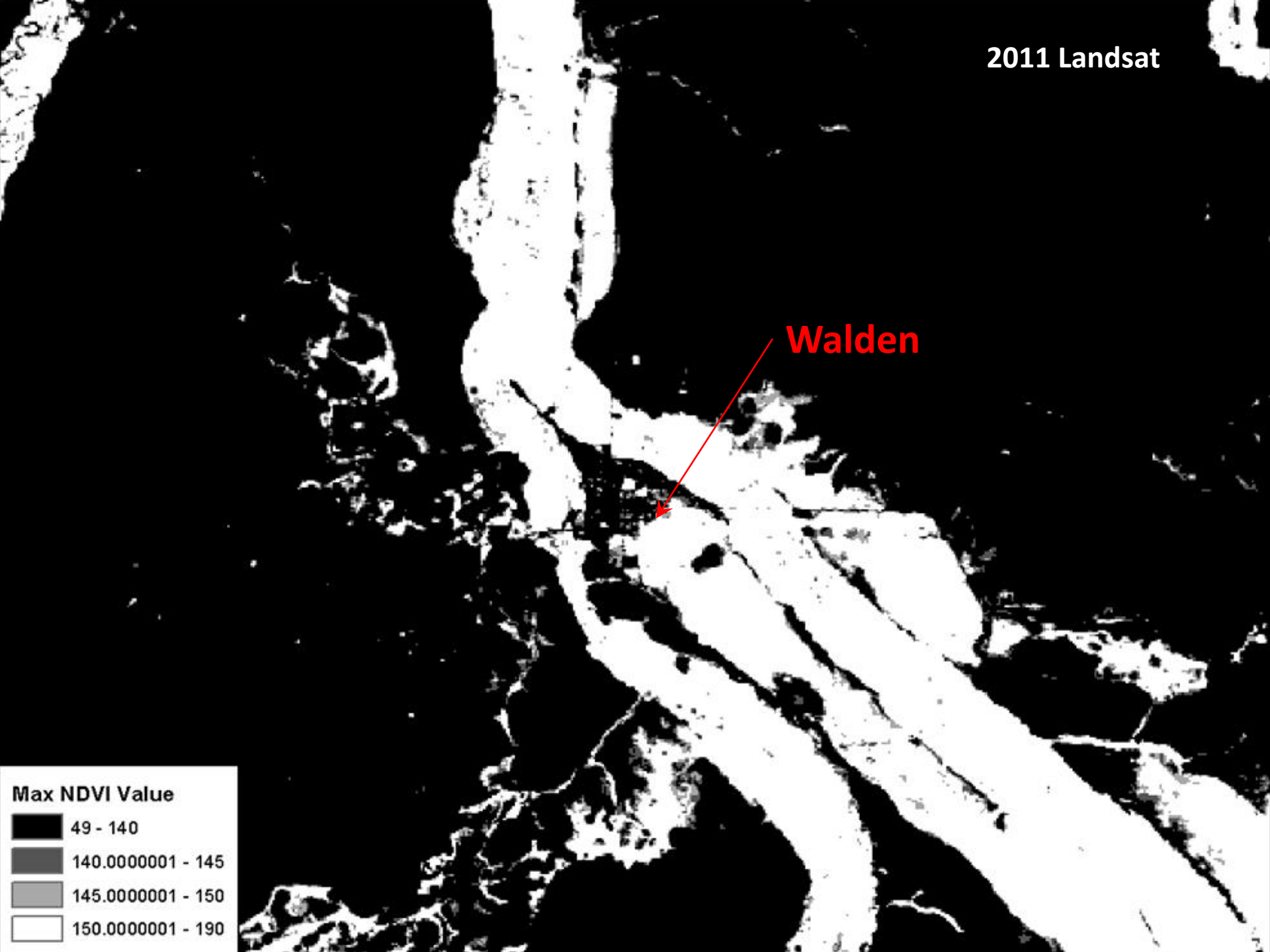
The Analysis Process

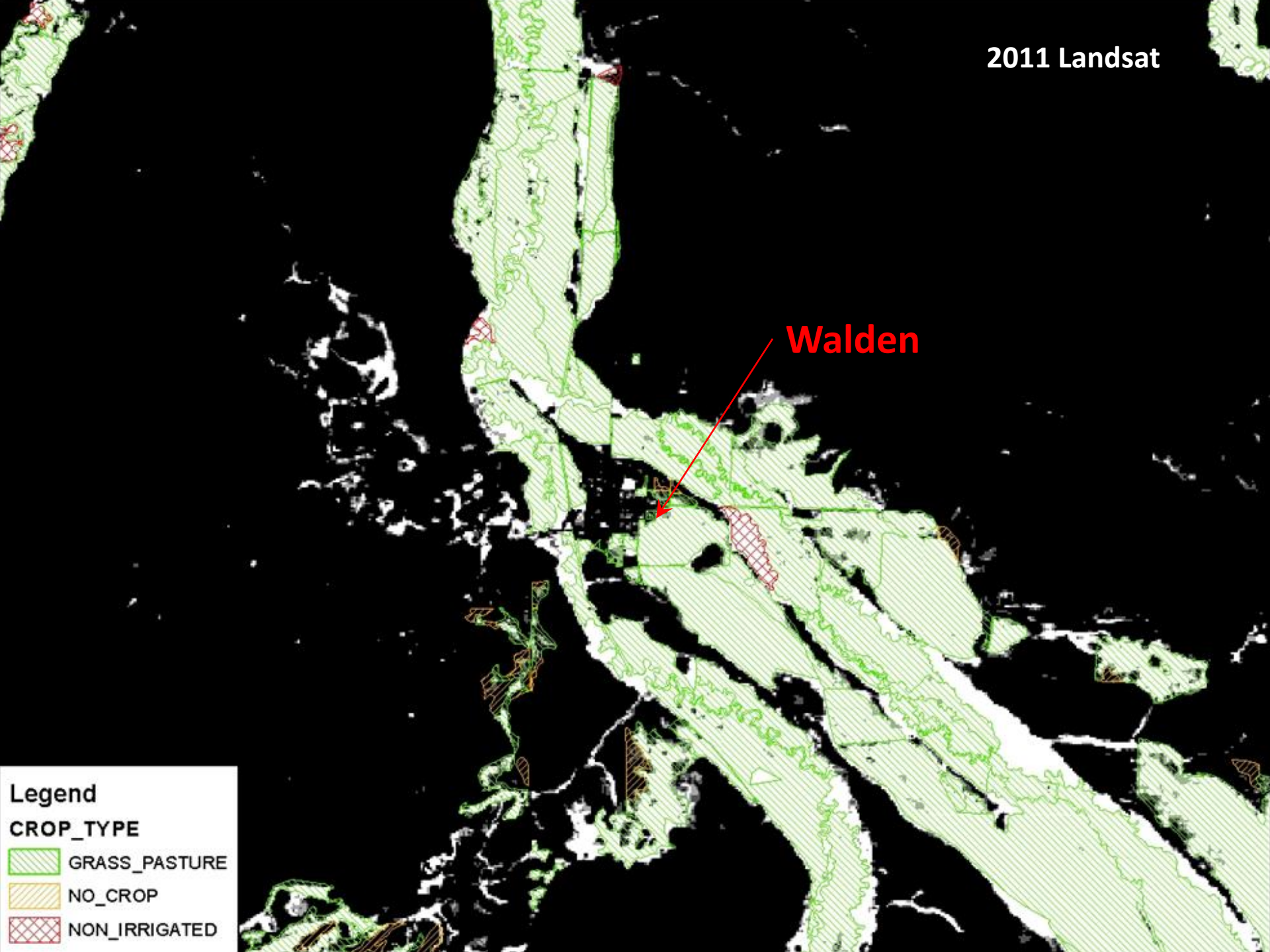
- We begin with the Landsat Imagery
- We collect as many cloud free 'scenes' as possible during the growing season (April-Oct)
- For 2011 (5/27 – 8/27) 4 Total Scenes
- For 2012 (6/18 – 9/22) 6 Total Scenes
- Process into a Max Normalized Difference Vegetation Index (NDVI) layer
- NDVI is a measure of 'greeness'
- Overlay Mapped Irrigated Lands to produce mean values of Max NDVI, majority crop type and percent majority crop type at the irrigated parcel level

The Analysis Process

- Areas that show low NDVI values (<150) are coded 'NO_CROP'
- Areas showing NDVI values > 150 are coded with the appropriate crop type
- For the North Platte headwaters, we only use 'GRASS_PASTURE'
- For irrigated parcels with marginal NDVI values, diversion records are analyzed to determine if water was available for irrigation
- The result is a GIS layer of irrigated parcels that contain crop type, irrigation method, acreage and irrigating structure

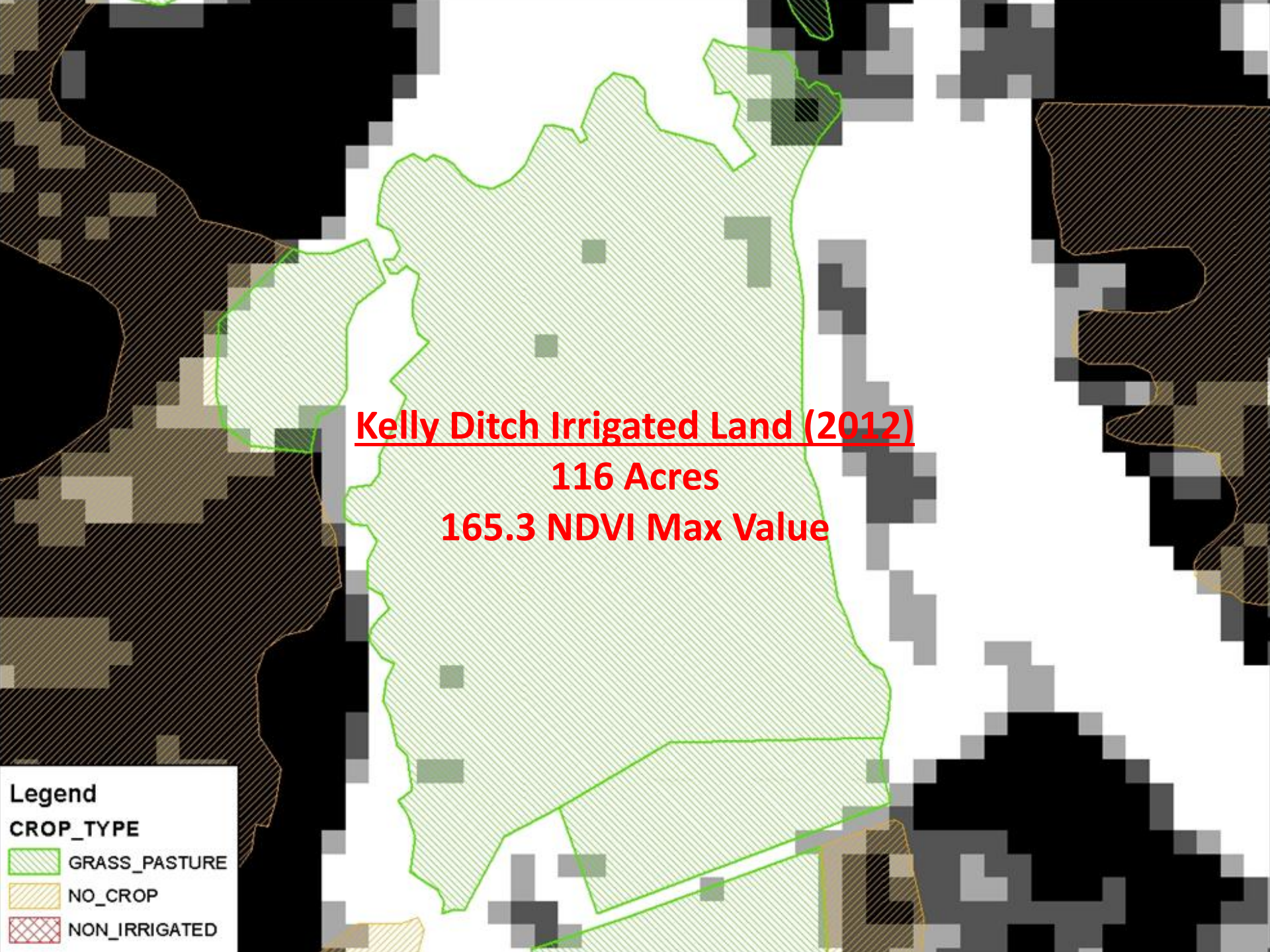

2011 Photo
Walden

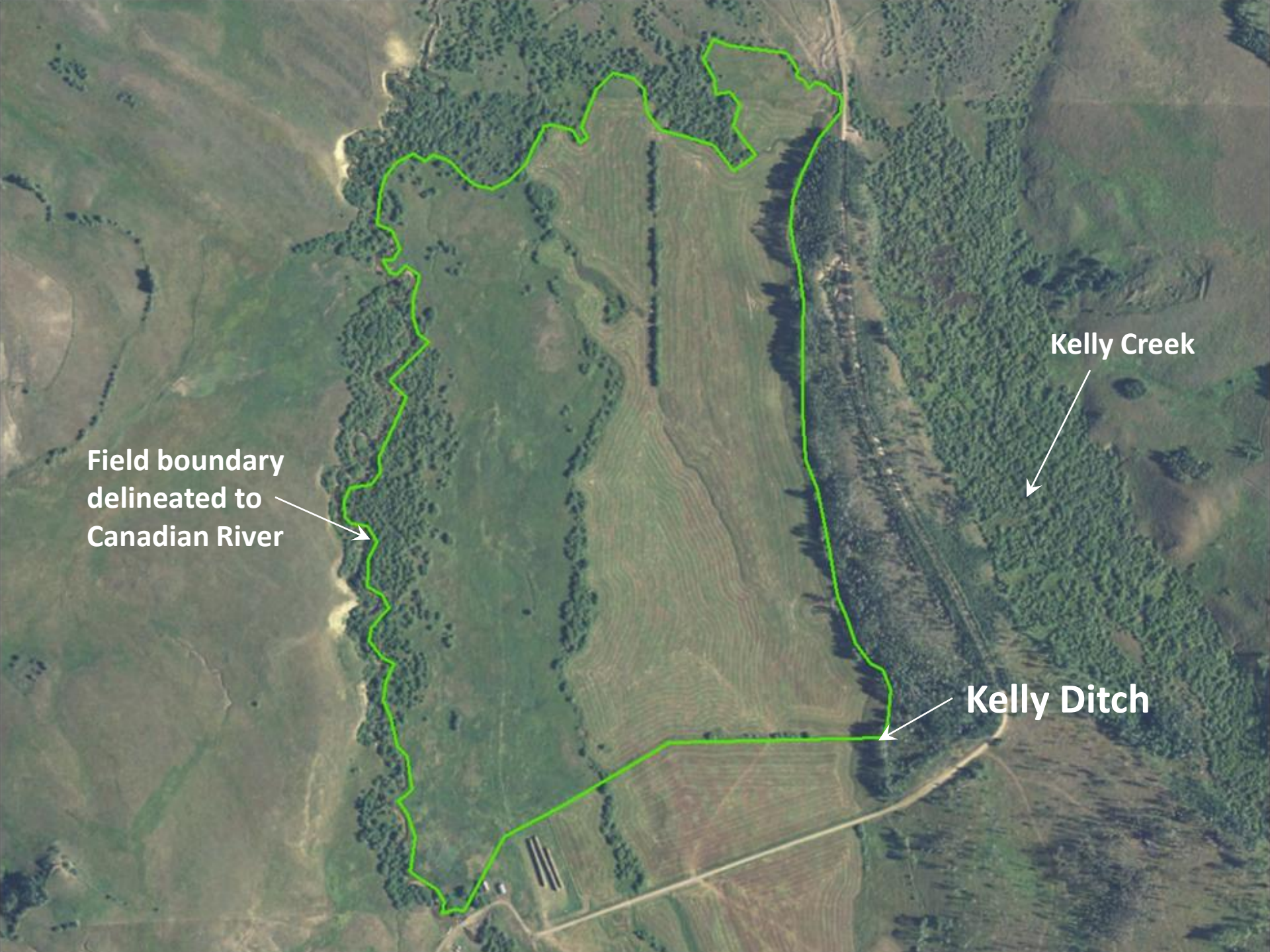

2011 Landsat
Walden
Max NDVI Value
49 - 140
140.0000001 - 145
145.0000001 - 150
150.0000001 - 190


2011 Landsat
Walden
Legend
CROP_TYPE
GRASS_PASTURE
NO_CROP
NON_IRRIGATED

The QC Process

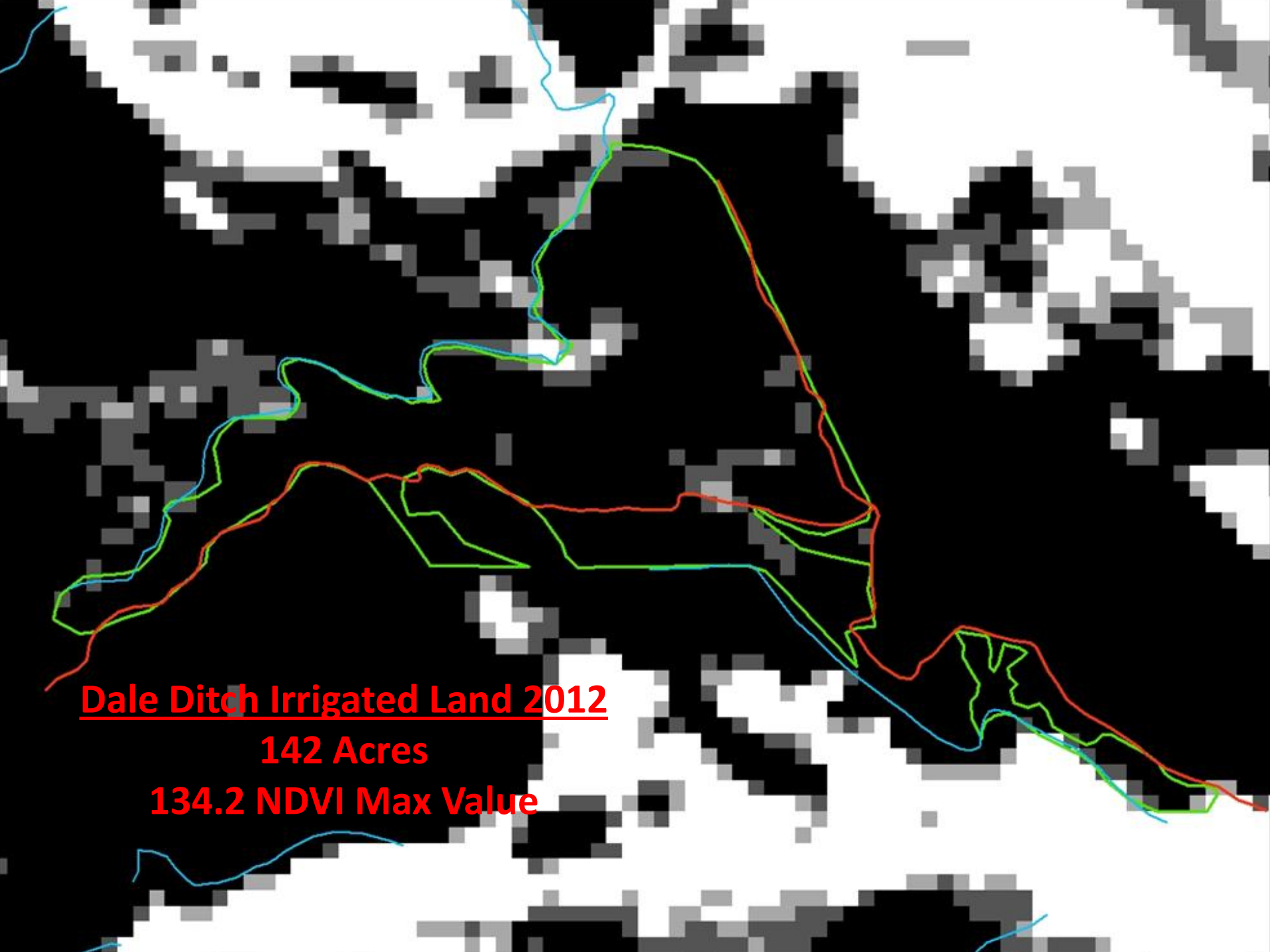
- We check diversion records to account for all diverting structures to assure they have associated irrigated lands
- However, we don't remove irrigated acreage due to a incomplete diversion record
- For example, the Kelly Ditch…
  - 2012 Diversion record reads 'Water Taken, but no data available'

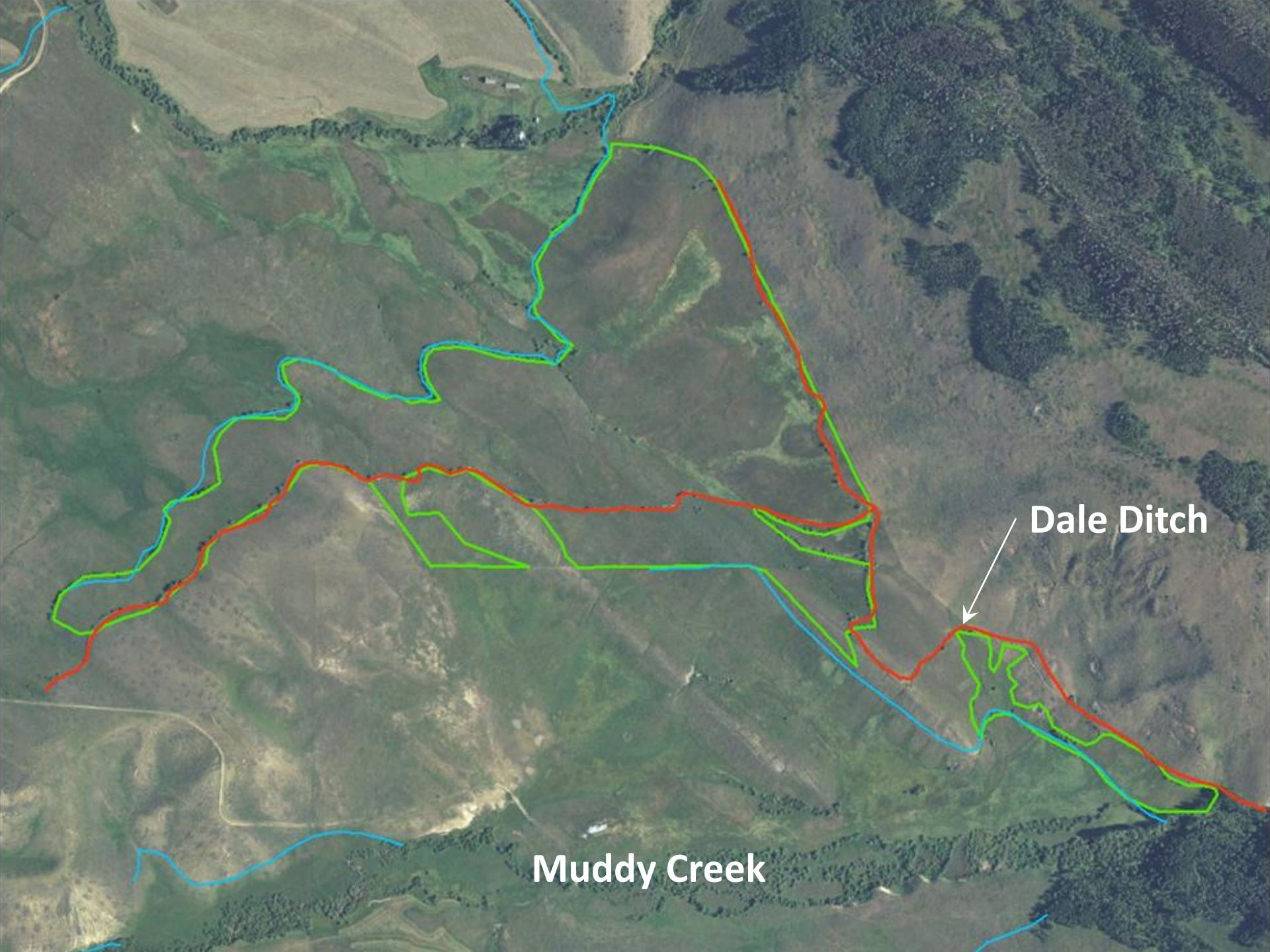

Kelly Ditch Irrigated Land (2012)
116 Acres
165.3 NDVI Max Value
Legend
CROP_TYPE
GRASS_PASTURE
NO_CROP
NON_IRRIGATED


Kelly Creek
Field boundary
delineated to
Canadian River
Kelly Ditch

The QC Process

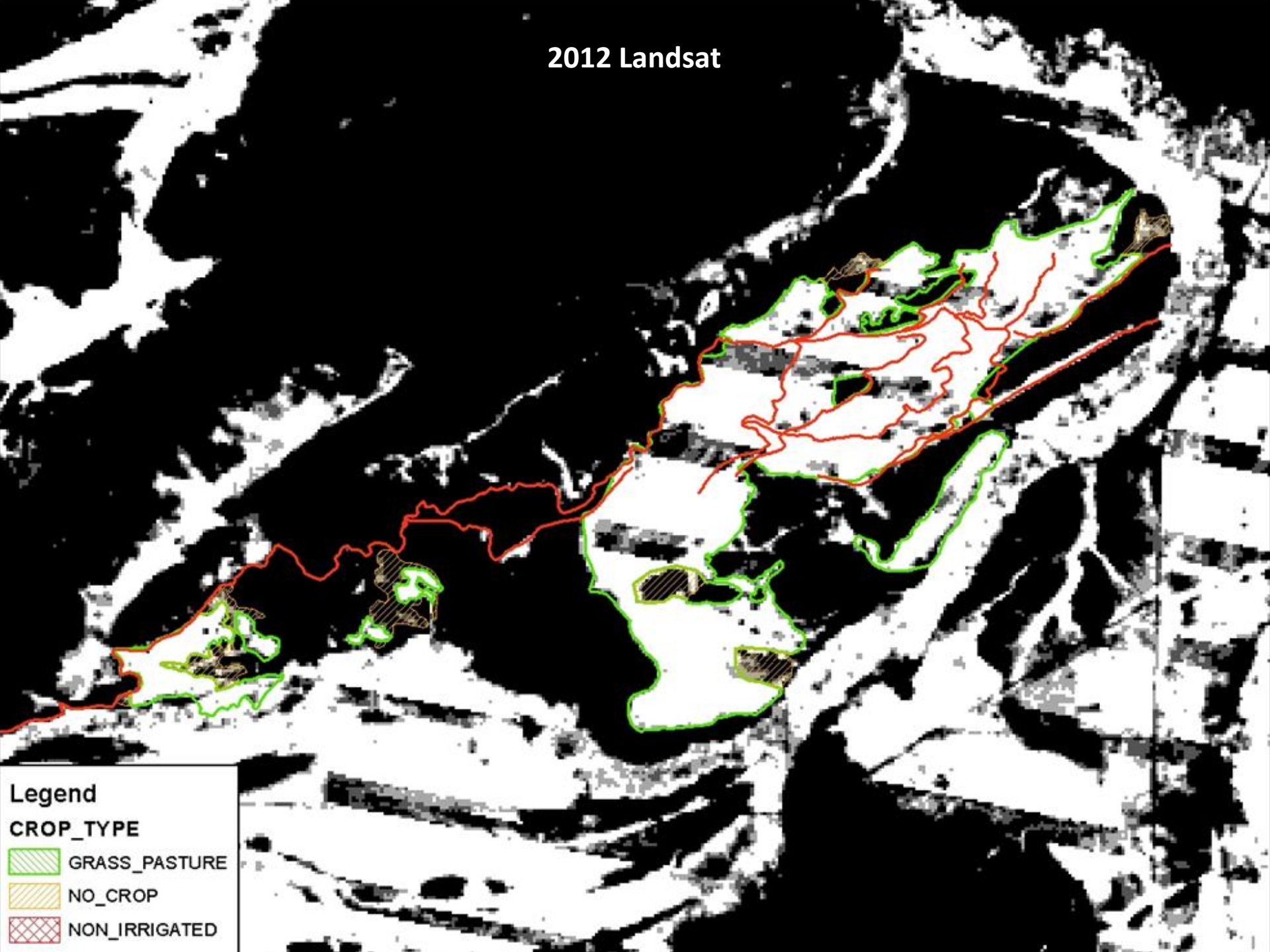
- Another example, the Dale Ditch…
  - 2012 Diversion record reads ‘Water available, but not taken’

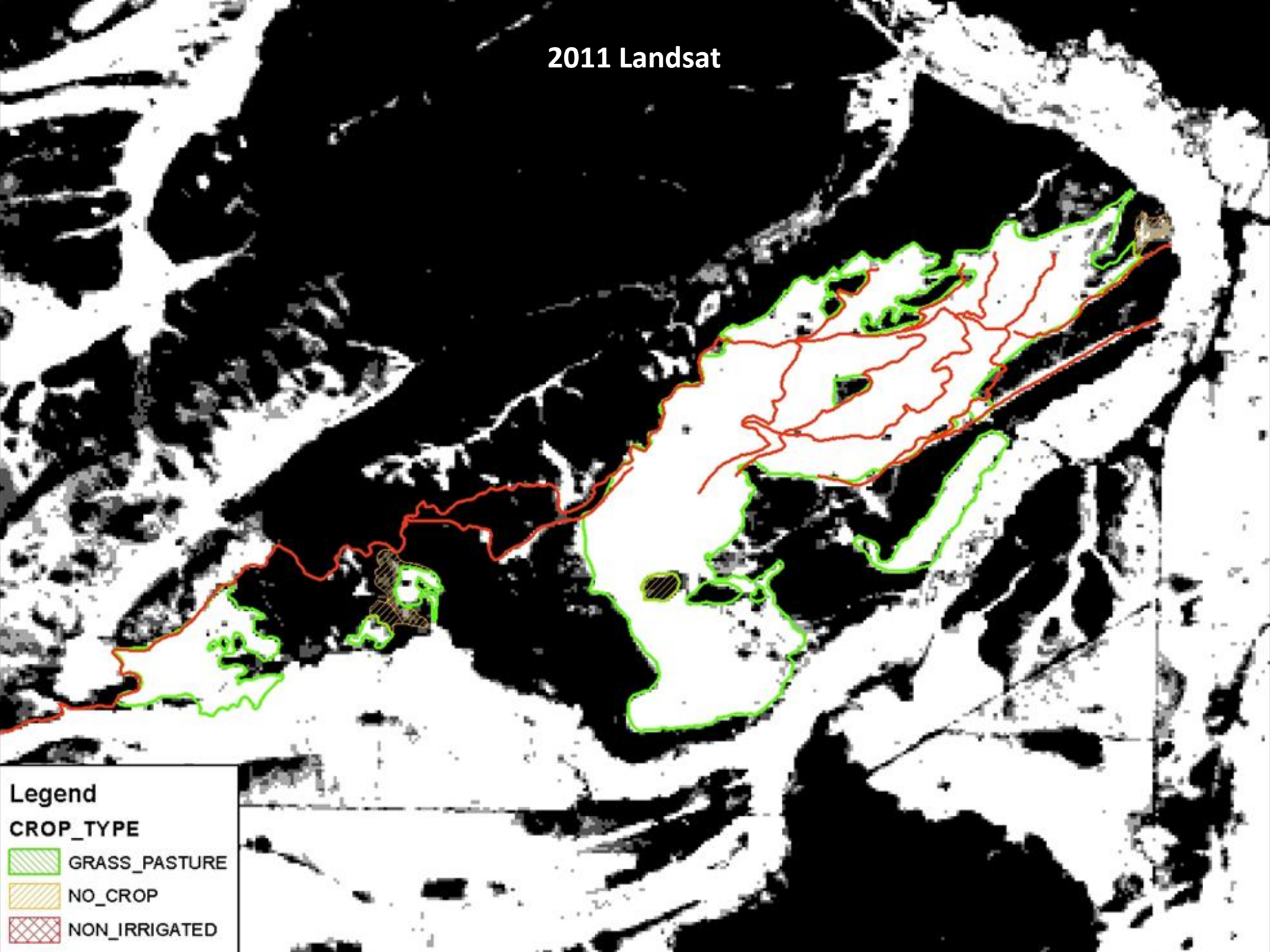

Dale Ditch Irrigated Land 2012
142 Acres
134.2 NDVI Max Value

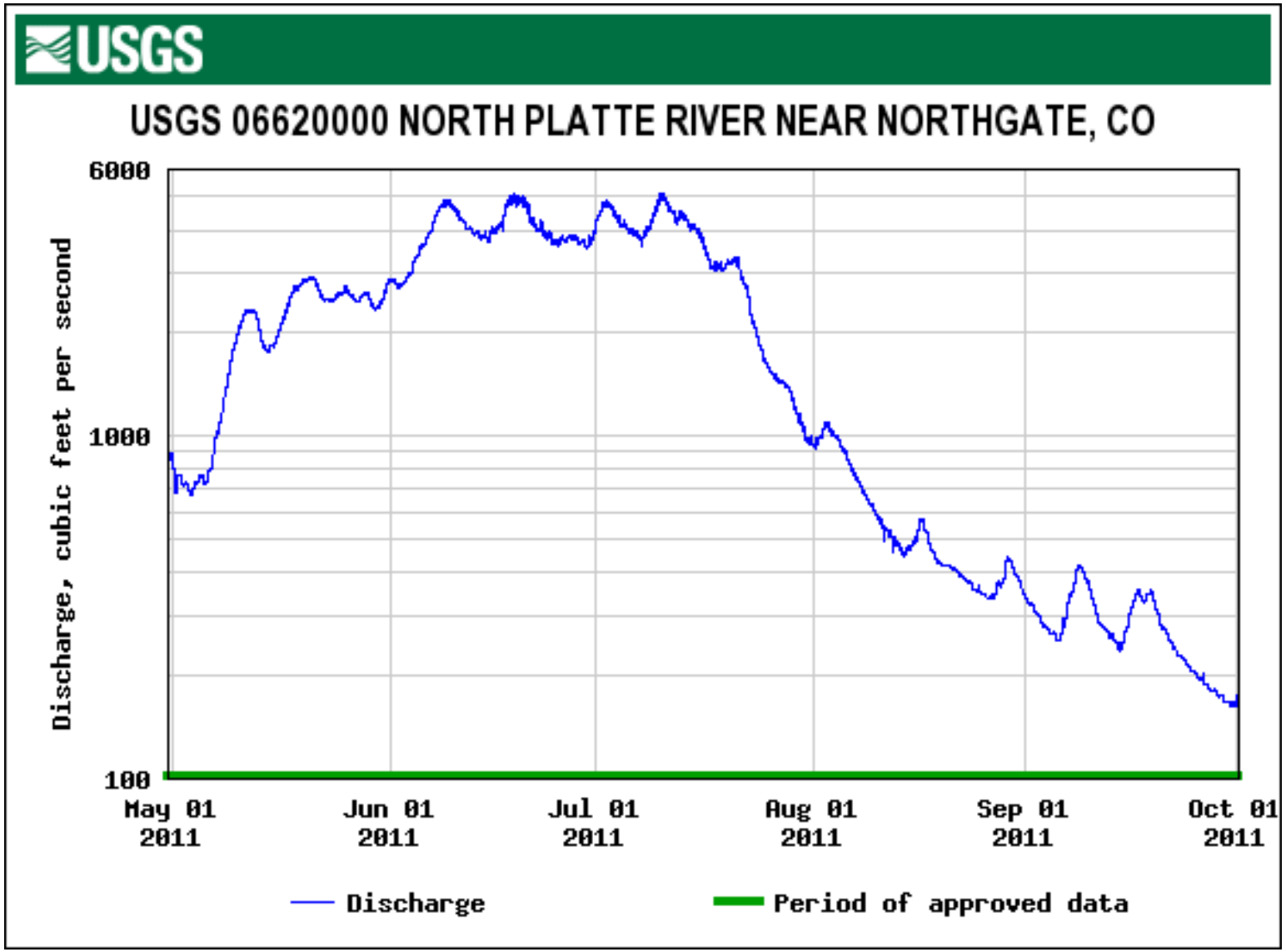

Dale Ditch
Muddy Creek

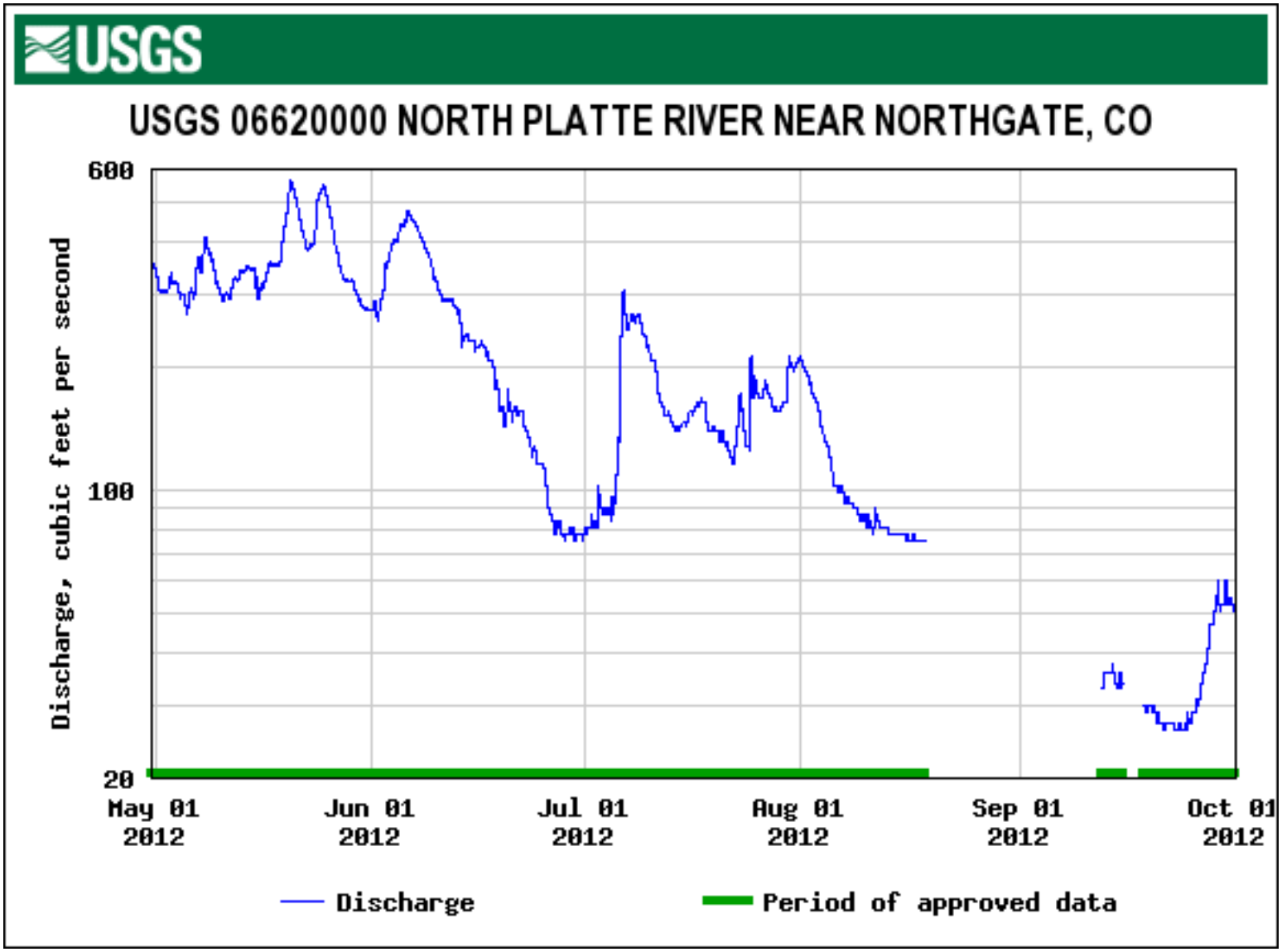
The QC Process

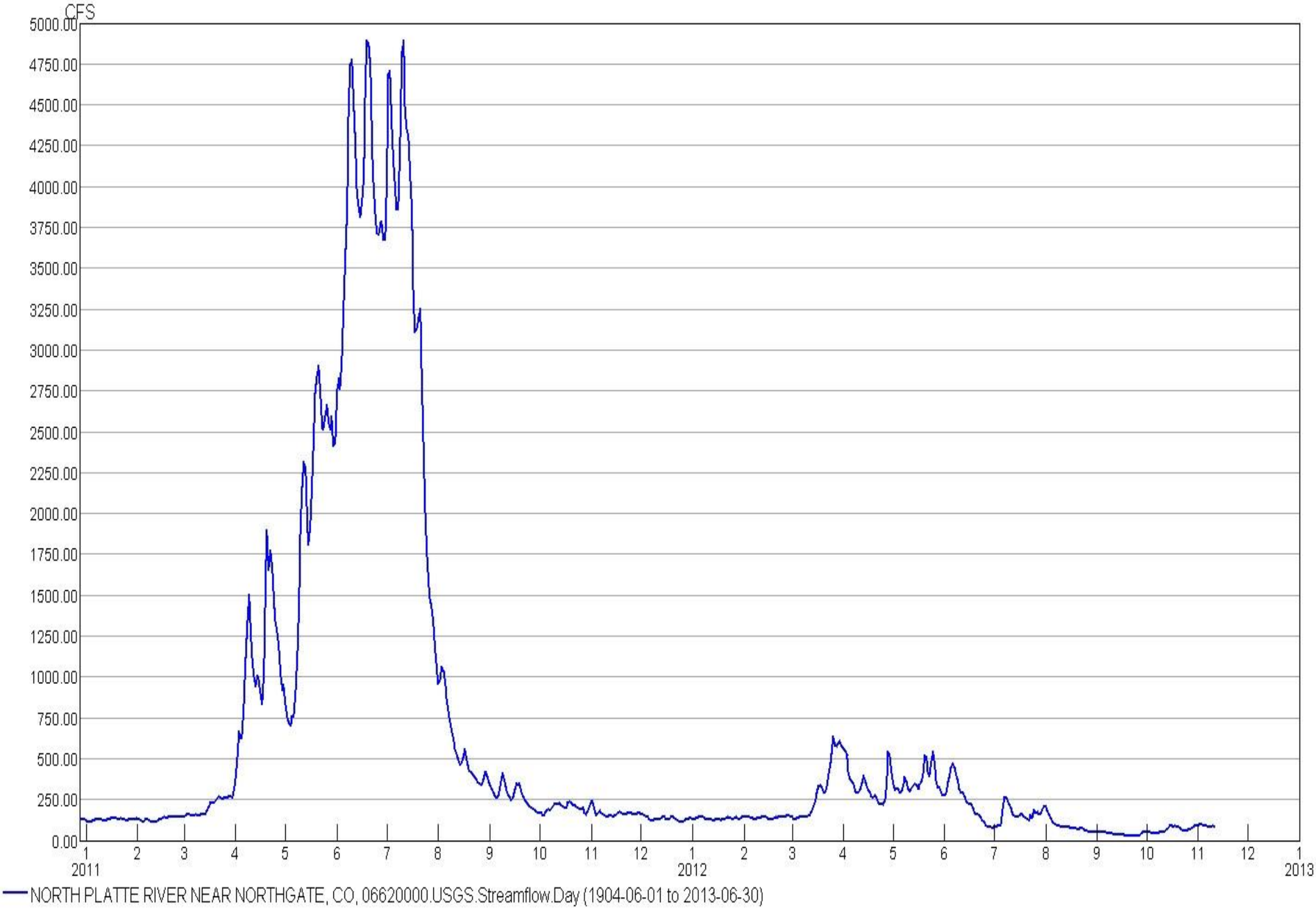
- Another example, the Darby Ditch…
  - Has complete diversion record
  - We've mapped 2,802 acres of irrigable land
  - 2012 -- 240 acres land coded as 'NO_CROP' (8%)
  - 2011 – 85 acres land coded as 'NO_CROP' (3%)


2012 Landsat
Legend
CROP_TYPE
GRASS_PASTURE
NO_CROP
NON_IRRIGATED


2011 Landsat
Legend
CROP_TYPE
GRASS_PASTURE
NO_CROP
NON_IRRIGATED


USGS
USGS 06620000 NORTH PLATTE RIVER NEAR NORTHGATE, CO
Discharge, cubic feet per second
6000
1000
100
May 01
2011
Jun 01
2011
Jul 01
2011
Aug 01
2011
Sep 01
2011
Oct 01
2011
Discharge
Period of approved data


USGS
USGS 06620000 NORTH PLATTE RIVER NEAR NORTHGATE, CO
Discharge, cubic feet per second
600
100
20
May 01
2012
Jun 01
2012
Jul 01
2012
Aug 01
2012
Sep 01
2012
Oct 01
2012
Discharge
Period of approved data


CFS
5000.00
4750.00
4500.00
4250.00
4000.00
3750.00
3500.00
3250.00
3000.00
2750.00
2500.00
2250.00
2000.00
1750.00
1500.00
1250.00
1000.00
750.00
500.00
250.00
0.00
1
2
3
4
5
6
7
8
9
10
11
12
1
2
3
4
5
6
7
8
9
10
11
12
1
2011
2012
2013
NORTH PLATTE RIVER NEAR NORTHGATE, CO, 06620000.USGS.Streamflow.Day (1904-06-01 to 2013-06-30)

The Results

- 2011 – we mapped 116,674 acres as irrigated (92%)
- 2012 – we mapped 84,607 acres as irrigated (67%)
- 2013 – ???

Questions

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