Economics of Remote Sensing
Remote Sensing Workshop

San Diego, California
September 27-28, 2012

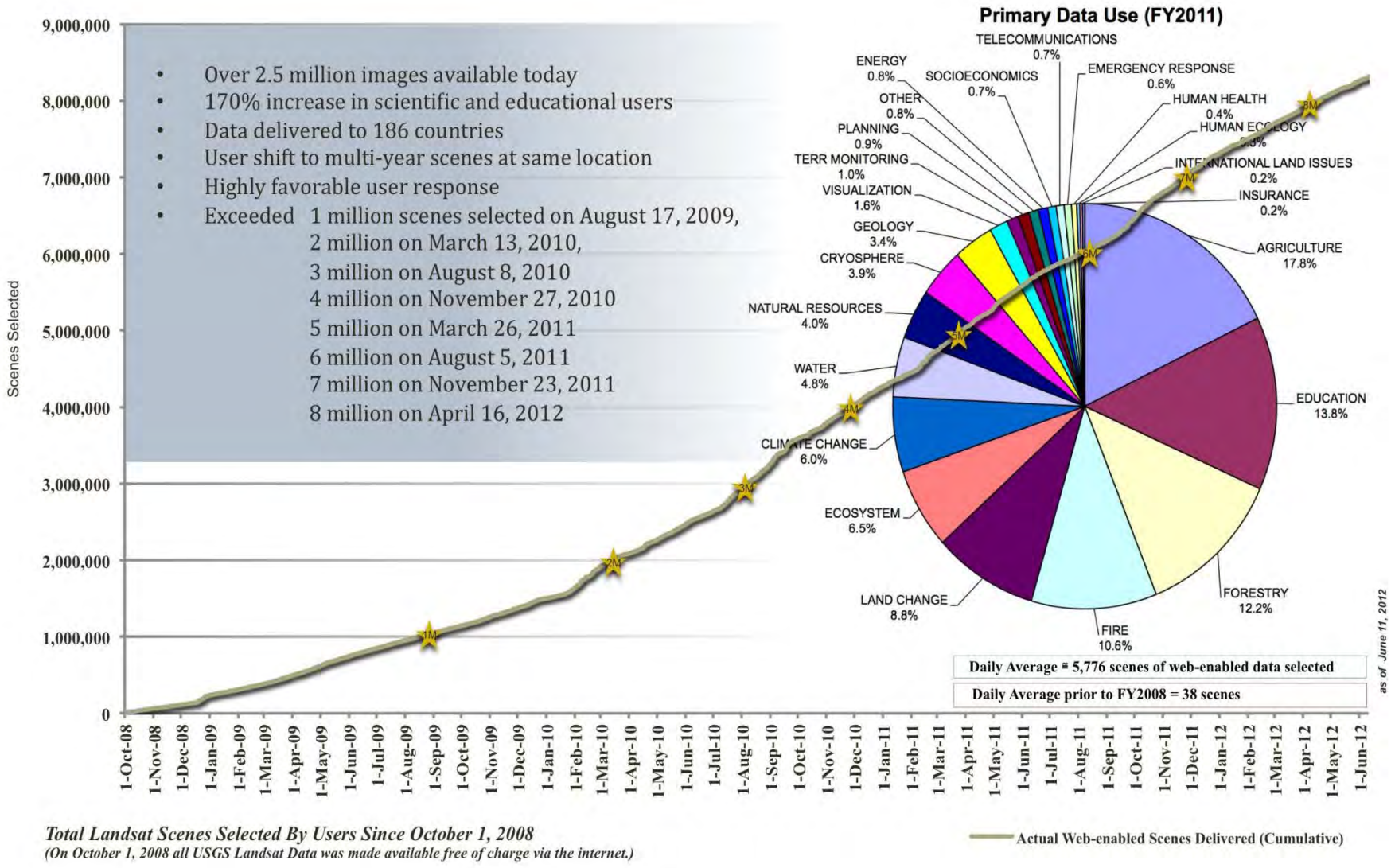
Tony Willardson, Executive Director
Western States Water Council

Estimated Annual Productivity Savings For Ten Landsat Applications

1. Monitoring Consumptive Outdoor Water Usage	$20 - $73 M
2. U.S. Government Mapping	over $100 M
3. Forest Health Monitoring	$12 M
4. Nat'l Agricultural Commodities Mapping	over $4 M
5. Flood Mitigation Mapping	over $4.5 M
6. Forest Fragmentation Detection	over $5 M
7. Forest Change Detection	over $5 M
8. World Agriculture Supply & Demand Estimates	over $3 - $5 M
9. Landsat Support for Fire Management	$28 - $30 M
10. Coastal Change Analysis Program	$1.5 M

- These ten Landsat applications alone produce savings of $180 million to over $266 million per year for the Federal and State governments.
- *The total annual economic value of Landsat data has recently been estimated at over $1.7 billion ("Recent Studies on the Economic Value of Landsat Data,"* Booz, Allen, Hamilton, April 2012*).*

Total Landsat Scenes Selected By Users



Total Landsat Scenes Selected By Users Since October 1, 2008
(On October 1, 2008 all USGS Landsat Data was made available free of charge via the internet.)

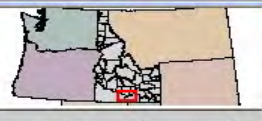
Make a Map of Idaho - Windows Internet Explorer

http://maps.idwr.idaho.gov/et/viewer.htm

Make a Map of Idaho

Idaho Department of Water Resources

Evapotranspiration



Zoom/Pan

Identify

Locate Address

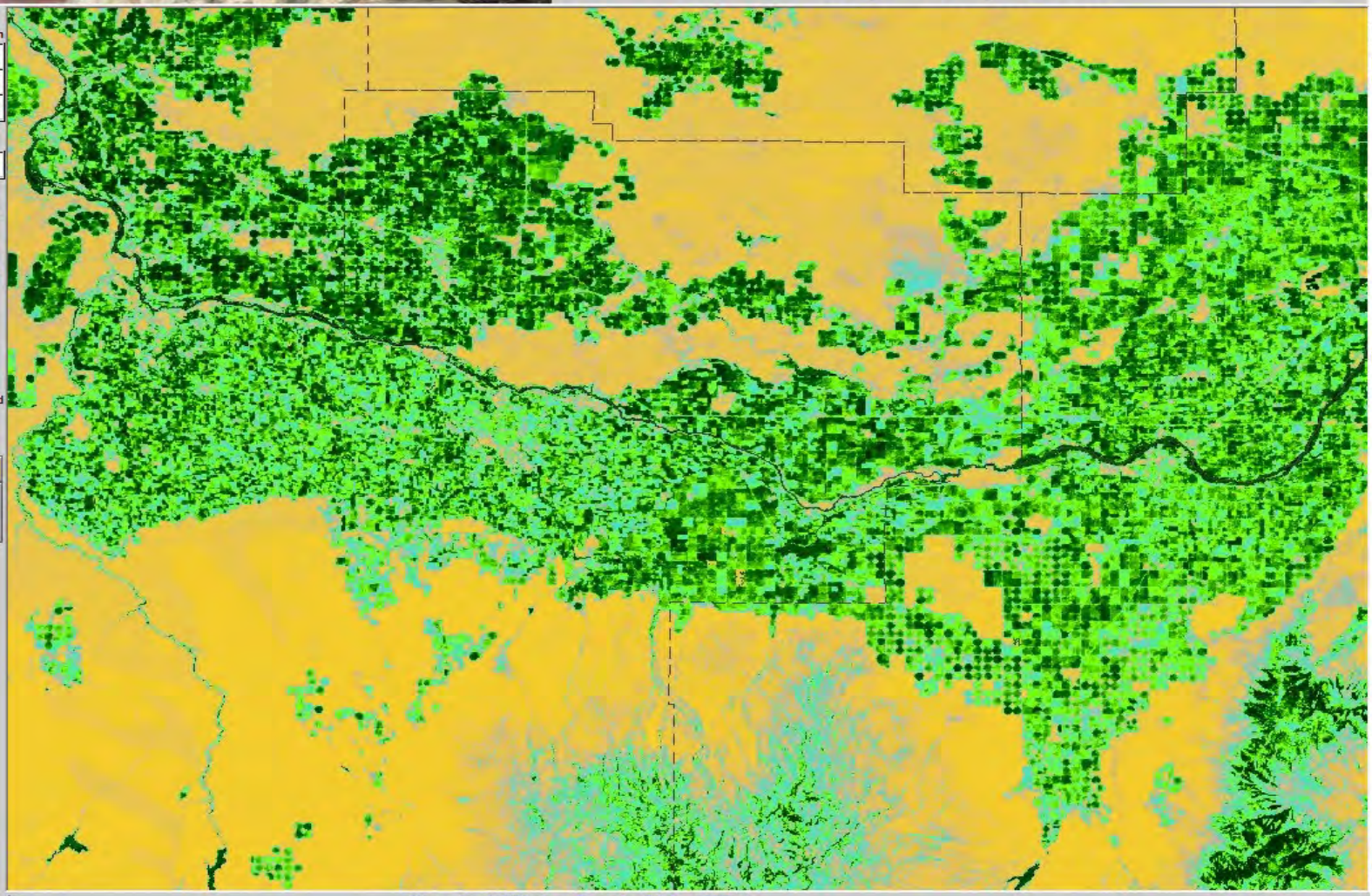
Capture Screen

Print

Download

Help

Map Server Menu



Layers | Legend | Metadata

- Base Map
- Evapotranspiration
  - 2003 -- P39R30
    - 2003 P39R30 6/5, 2
    - 2003 P39R30 7/7, 2
    - 2003 P39R30 8/24,
    - 2003 P39R30 6/1-9,
    - 2003 P39R30 LAND
  - 2000 -- Southern Idaho
    - 2000 Snake Plain 3/:
    - 2000 P3940 LANDS
  - 2000 -- P42R2930
  - 2000 -- P41R30
  - 2000 -- Lemhi
  - 1997 -- P42R30
  - 1985 -- P39R3031
- Background Images

Active Layer

Counties

Refresh Map

Zoom In

Download GIS data from the Idaho FTP site.

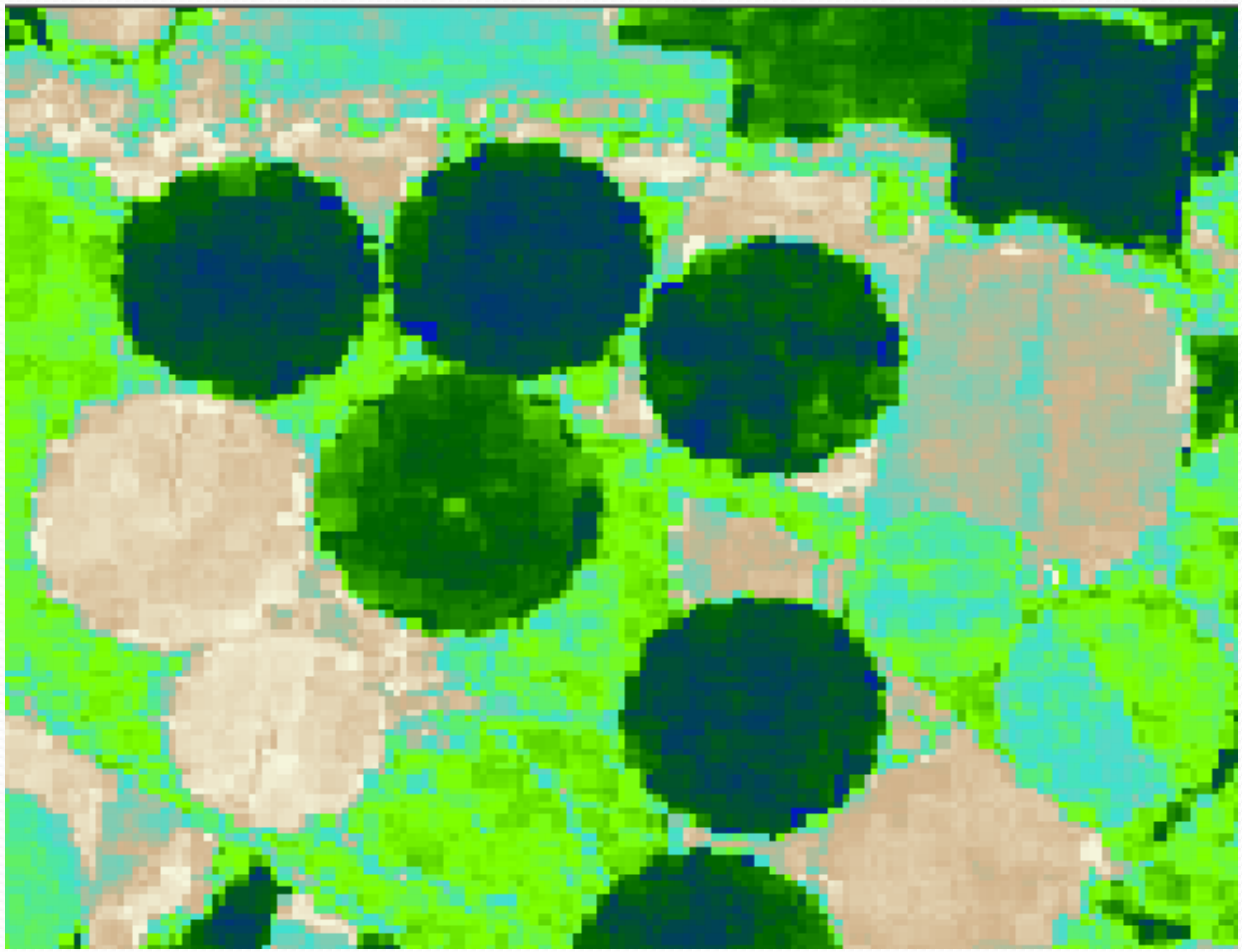
Done

Internet

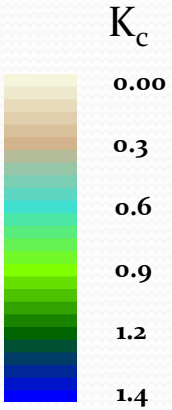
100%

start | Pegasus Mail | 2 Firefox | Adobe Acrob... | 3 Microsoft... | Microsoft Word | RickJan2007... | Norton File M... | Make a Map ... | 12:27 PM

Why use High Resolution Imagery?



ET from Landsat 5 with thermal sharpened to 30 m

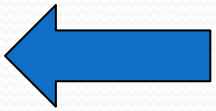


$(K_c = ET_{act} / ET_{ref})$

ET from individual fields is essential for: Water Rights, Water Transfers, Farm Water Management

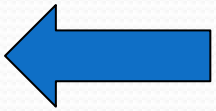

Imperial Valley, CA
via Landsat 7
Imperial Valley
ET (mm)
0
100
200
300
400
433
ET during January – March, 2003

Demand



Agricultural
Municipal
Industrial
Energy
Environment
Recreation
Evapo-transpiration

Supply



Precipitation
Snowpack
Streamflow
Groundwater
Reservoirs
Wastewater
Saline Waters

United States Senate

WASHINGTON, DC 20510

May 5, 2008

Senator Robert C. Byrd
Chairman
Committee on Appropriations
Washington, D.C. 20510

Senator Thad Cochran
Ranking Member
Committee on Appropriations
Washington, D.C. 20510

Senator Barbara Mikulski
Chairwoman
Subcommittee on Commerce,
Justice, Science & Related Agencies

Senator Richard Shelby
Ranking Member
Subcommittee on Commerce,
Justice, Science & Related Agencies

Dear Chairman Byrd, Chairwoman Mikulski, Ranking Member Cochran, and Ranking Member Shelby:

We are writing to request inclusion of $35 million in NASA's budget for FY 2009, to design, construct and deploy a thermal infrared (TIR) instrument on Landsat 8 that will provide data continuity consistent with that now available from Landsat 5 and Landsat 7. The total funding commitment required for a TIR instrument on Landsat 8 should be between $90 and $100 million over three years.

The future of our Nation's water resources is increasingly unclear. Conflicts over water use are growing, and the serious situation in the Southeast demonstrates that scarcity isn't just a problem in the West, where water has always been a scarce resource and roughly 80% of all consumptive water use is for irrigation. Across the U.S. water demands for agriculture, energy production, and municipal and industrial uses are rising, while reservoir and ground water levels are falling. It is clear that more data on water supplies and water uses will be needed to address present and future water problems.

Today, TIR data is essential for measuring and monitoring evapotranspiration and calculating consumptive water usage, particularly for agriculture. This data stream has been the gold standard for administration of water transfer agreements as it provides a cost effective means of determining not only present, but past consumptive use, given the U.S. Geological Survey's (USGS) archive of TIR data collected since 1982.

We are grateful that the Appropriations Committee is committed to ensuring the continuity of these unique and fundamentally valuable data streams. In particular, the FY 2008 Consolidated Appropriations Act included the following language: "NASA is directed to provide a plan on all continuity of data for the Landsat Data Continuity Mission (LDCM) to the Appropriations committees no later than 120 days after enactment of this Act. The amended bill provides $1 million above the budget request for this mission to ensure data continuity."

Unfortunately there is evidence that NASA does not share the Committee's priorities. Although NASA plans to present its report to the committees later this month, in a December 19, 2007 letter, Administrator Michael Griffin stated, "While thermal data is scientifically relevant, analysis of the mission development cost and schedule indicates that LDCM cannot be implemented with the thermal capability within the present budget constraints. Additionally, if the thermal infrared sensor were added, it is likely that NASA would be unable to maintain the current launch readiness date and, consequently, the undesirable gap in data continuity between existing Landsat capability on-orbit and the launch of LDCM would be increased."

Administrator Griffin omits the fact that a thermal infrared (TIR) instrument was included on Landsat 4 in 1982, Landsat 5 in 1984, Landsat 6 in 1993 and Landsat 7 in 1999. Without TIR on the next spacecraft, the Landsat Data Continuity Mission will not be complete, and we fear none of the TIR alternatives under NASA review will prove acceptable. A delay in the launch of Landsat 8 merits serious NASA consideration, rather than prematurely eliminating what has become an invaluable practical application of our nation's investment in NASA-pioneered research and development.

Landsat 5 and 7 TIR data has become an irreplaceable resource for a variety of applications that are increasingly important, but hampered by the uncertainty surrounding its future availability. There is no other comparable federal source of this data, a past privatization attempt proved "troublesome" in NASA's own words, and relying on limited foreign data sources would prove costly and difficult.

However, unless NASA is directed to include TIR on Landsat 8 and sufficient funds are appropriated, we will be without perhaps the single most important instrument capable of measuring by far the largest use of water in the West. While we recognize the present budget constraints, we urge you to fund a TIR instrument in NASA's LDCM budget for Landsat 8.

Sincerely,

Tony Willardson, Executive Director
Western States Water Council
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801-685-2555