Cloud Services Integration Platform (CSIP) Model and Data Services

An Overview

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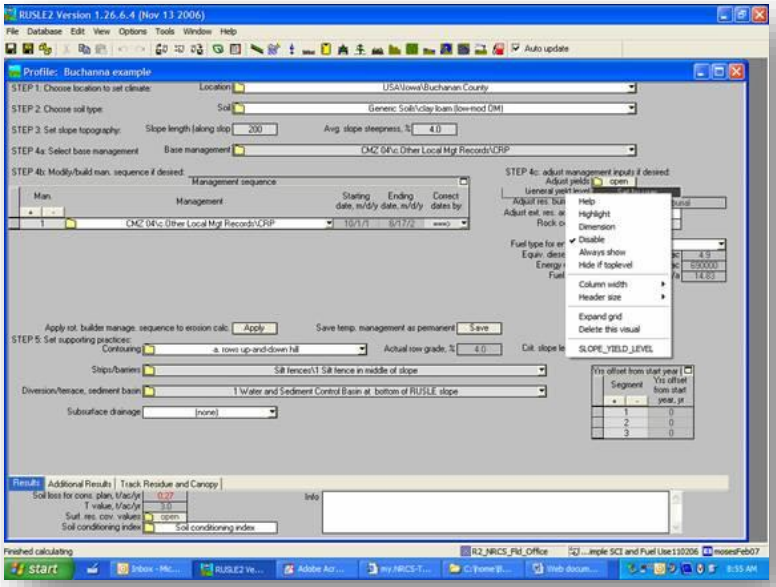
Deployment Technology Shift



Model as a Service

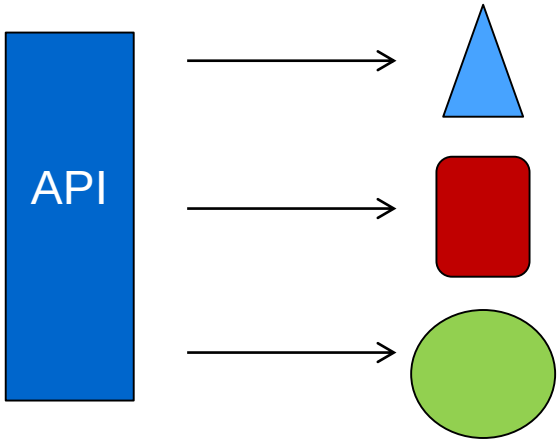
- "Software-as-a-Service" flavor

  " … being able to call up scientific models and components across a network. [Roman 2009]"

- Service Exploration, Meta Data aspect
- Simple application interface, standards for data and interoperability
- Programmatic use

MaaS addresses

- Model reuse and repurpose
- Model deployment, distribution, and maintenance.
- Data provisioning
- Programming Language constraints
- Separation of UI and engine



CSIP

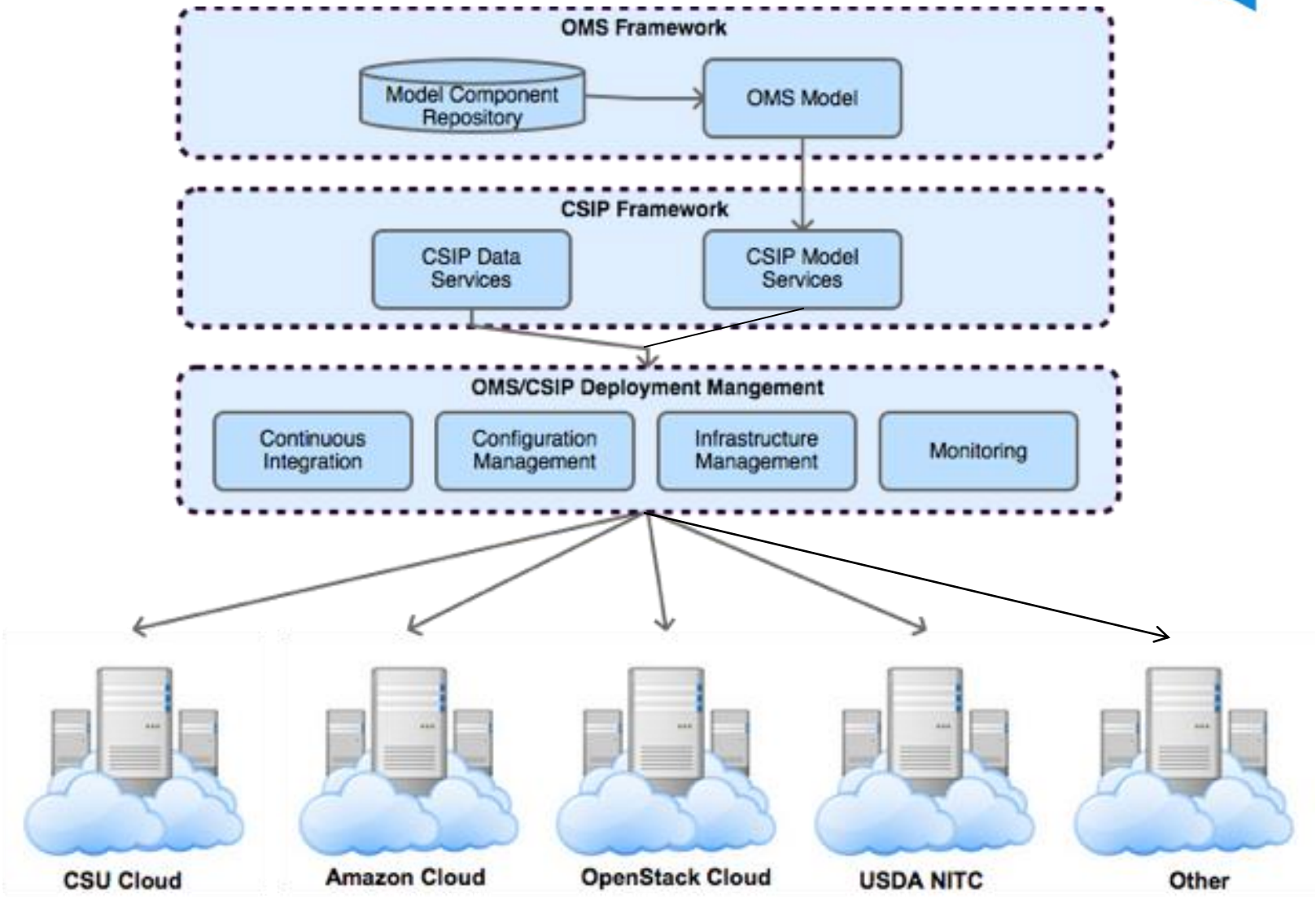
- Cloud Services Integration Platform
  - Annotation-based MaaS SoA Platform
  - Server-API / Client-JSON / Restful
  - Registry, Exploration, Execution
  - Cloud agnostic
  - Traceability, Scaling, Archival, Caching
  - Asynchronous Workflow
  - Ensemble runs

https://alm.engr.colostate.edu/project/csip

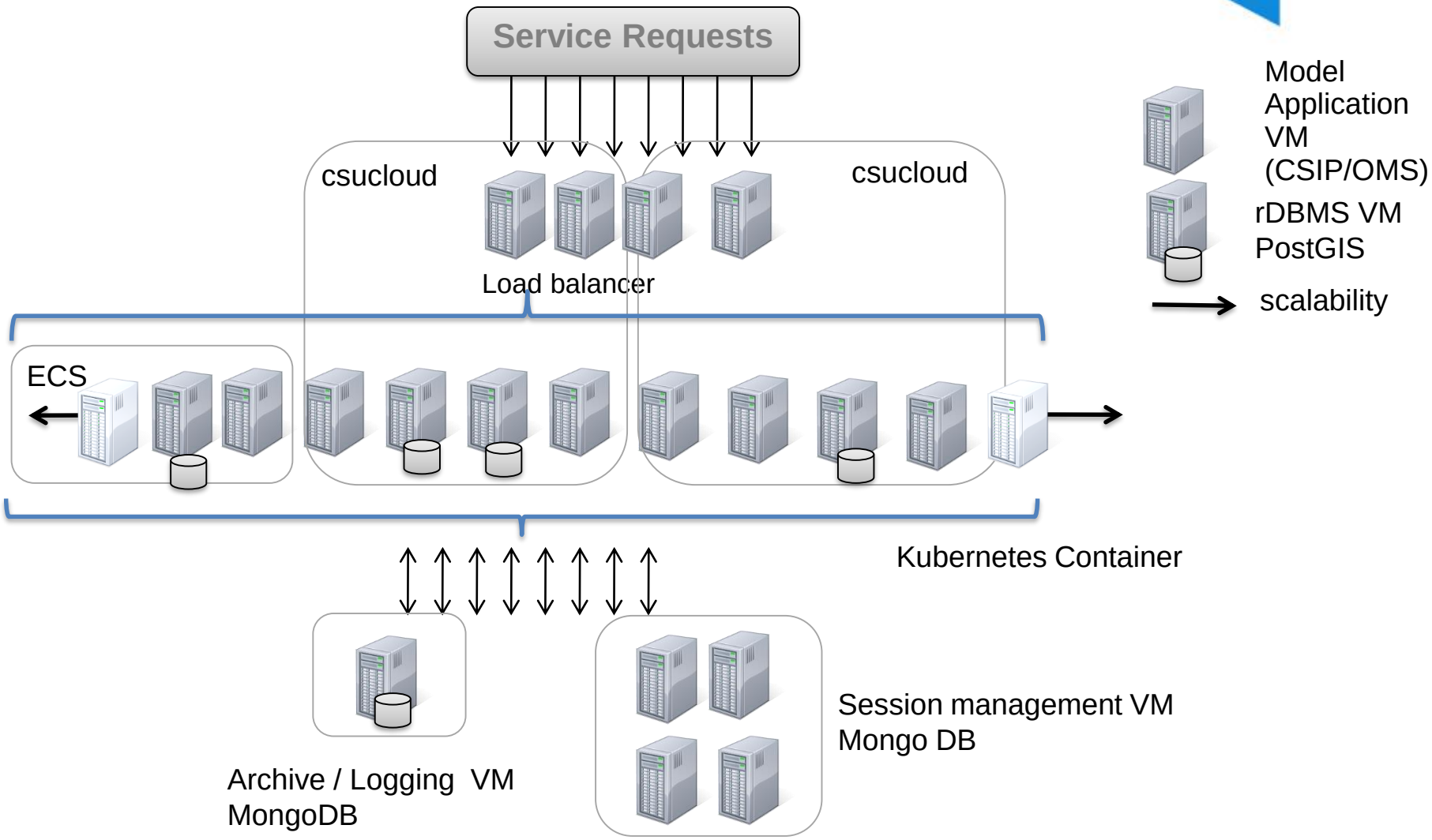
History

- 2012 - Explore cloud options for running environmental models
- 2013 - Implement CSIP prototype by extending OMS3 into SoA
- 2014 - CSIP erosion model and data services for various applications
- 2015 -18 - 250+ model & data services for 10+ (research) projects

OMS3 – CSIP Relationship



CSU Deployment



https://alm.engr.colostate.edu/project/csip

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CSIP Wiki #6847 v130 0

more

Tags: Cloud MaaS Modeling REST Services SOA

Cloud Services Integration Platform (CSIP)

The **Cloud Services Integration Platform** is a SoA implementation to offer a **Model-as-a-Service** framework/API, deployment infrastructure, and service implementations for environmental modeling. CSIP leverages JAX-RS and OMS3, currently offering 150+ different model and data services.

This project provides all means to explore existing, develop new, and access provided CSIP services. If you want to browse the full list, click "All Services". The services are also categorized into domain related groups and by client application as listed below. If you want to develop CSIP services and/or want to use them in your application, check out the resources under Development.

Development

CSIP 2.0 Manual
CSIP Platform Repository

FAQ
CI with Jenkins

Tutorials

NEW Developing Services (Docker)
NEW Invoking Services (Postman)

Services

All Services
A complete list of all services (160+ services)

Service Packages
All packages, links to repositories, CI Builds, CI Test results and packaged services.

Deployment Platforms
All deployment platforms with links for deployed service packages and databases.

Services by Category

Comprehensive Flow Analysis (CFA)
Baseflow, Flood, Drought, Flow Duration, Load Duration, State discharge, etc. (12 services)

Hydraulics
Cross Section Sediment Transport, Effective Discharge, etc. (3 services)

Hydrotools
TR-20 model with converters for HEC-RAS, NRCC, and NOAA; EFH2 (8 services)

Wind and Water Erosion (WWE)
Erosion Services, WEPS, R2, STIR, SCI, Soils, WEPP (17 services)

Grassland Resource Analysis System (GRAS)
Animal inventory and herd description, forage inventory, grazing schedule, forage animal balance, and

CSIP Navigation Bar

Shortcuts
- All Services
- Deployment Platforms
- Service Packages

Jenkins CI
- Build Statistics
- Test Statistics

Documentation
- CSIP 2.0 Manual
- NEW Getting Started

Releases
- Released Packages

Help
- Report a bug

New Users
1. Get an ALM account
2. Join the CSIP project

Contact Us:
Jack Carlson
Coordinator, OMS Laboratory
Jack.Carlson (at) colostate.edu
(970) 492-7323

Olaf David
Director, OMS Laboratory
odavid (at) colostate.edu
(970) 491-8026

This site is powered by codeBeamer 7.8.0 (mysql) | Bug / Feature Request | Knowledge Base

OMS/CSIP Support to NRCS: Conservation Delivery Streamlining Initiative (CDSI)

Services: LMOD, LAMPS, Soil, Climate, WEPS, GRAS, WQM deployed/completed
WEPP, Cligen, Windgen in progress; RHEM, DayCent, and FIRI to be added

csip » Reports
Grassland Resource Analysis System (GRAS) » Report Results #4321320

Edit Export Run

Grassland Resource Analysis System (GRAS) Services

The web services of the Grassland Resour
inventory and herd description, forage inve
supports the Rangeland Health Assessmer

GRAS has its own data mart containing an

GRAS is part of a continuum of NRCS graz

The computational logic and data definition

Tracker: csip - Services found 32 recor

32 items found.

Service Name

GRAS-09: Calculate Animal Herd Forage Demand (CalcAnimalHerdDemand)

GRAS-14: Calculate Quick Stocking Rate (CalcQSRate)

GRAS-08: Compute Breeder and Offspring Attributes (CompReprodAttributes)

GRAS-06: Calculate Monthly and Daily Forage Production for an Area of Analysis (CalcProdMonthlyDaily)

GRAS-11: Calculate Grazing Schedule Period Forage Animal Balance (CalcPeriodFAB)

GRAS-07: Get Animal Attributes for Herd (GetHerdDescrAttrib)
SVC-451205

csip » Reports
Water Quality Module (WQM) » Report Results #4282082

Edit Export Run

Water Quality Module (WQM) Services

These services support the Water Quality
ratings for surface and ground water, con
practices, and crop management adjustm

WQM incorporates pesticide-related data
(CEAP). WQM also adapts mitigation sco

The computational logic and data definitic

Tracker: csip - Services found 20 reco

20 items found.

Service Name

WQM-05: Nutrient Soil Leaching Potent (NutrientSLP)

WQM-06: Sediment and Nutrient Soil R (SedNutSRP)
SVC-450979

WQM-08: Pesticide Soil Solution Runof (PesticideSSRP)

WQM-07: Pesticide Soil Leaching Poter (PesticideSLP)

WQM-09: Pesticide Soil Adsorbed Runo (PesticideSARP)

WQM-11: Pesticide Hazard Ratings (Pe

WQM-04: Pesticide Attributes and Loss (WQMPestLossPot)

csip » Reports
Land Management Operations (LMOD) » Report Results #4241886

Edit Export Run

Land Management Operations (LMOD) Services

These web services provide land
(LMOD) contains more than 40,0
applications, planting, harvest, etc

Most data currently in LMOD was
System (WEPS). As other agro-e

Tracker: csip - Services found

P	Service Name
≡	LMOD Managements
≡	LMOD Barriers
≡	LMOD Crops
≡	LMOD Operations
≡	LMOD Residues
≡	LMOD Contours
≡	LMOD Update
≡	LMOD Imports
≡	LMOD Hyraulic Elem
≡	LMOD Permeable Ba

csip » Reports
Integrated Erosion Tool (IET) » Report Results #4326844

Edit Export Run

Integrated Erosion Tool (IET) Services

The Integrated Erosion Tool (IET) services enable the analysis of soil erosion by water and wind using the Revised Universal Soil Loss Equation (RUSLE2) and Wind Erosion Prediction System (WEPS) models developed by the USDA Agricultural Research Service (ARS). The services support a geospatial IET application extending the resource analysis functionality of the USDA Natural Resources Conservation Service (NRCS) Customer Service Toolkit (CST) deployed to 2,800 agency county offices. CST has been used for several years to manage more than 1 million conservation plans on 300+ million acres of agricultural land. IET services also support the Keystone Center's Field to Market Initiative involving a consortium of public and private sector food supply chain organizations.

IET services calculate sheet/rill erosion, wind erosion, PM10 air particulate matter, soil condition index (SCI), and soil tillage intensity rating (STIR). In the coming months the ARS Water Erosion Prediction Project (WEPP) model service will be added providing concentrated flow erosion, gully erosion, and sediment delivery calculations. The Rangeland Hydrology and Erosion Model (RHEM) model service will calculate soil erosion by water on rangeland.

Tracker: csip - Services found 16 records

16 items found.

Parent	P	Service Name	Status	Submitted at	Submitted by	Modified at	Modified by	Type	Path	Context	Version	En
--	≡	WEPS Wind Erosion (v1.3)	DEPLOYED	Jun 20 15:17	wlloyd	Jun 22 15:11	wlloyd	Model	csip-erosion/m/weps/1.3	csip-erosion	1.3	htt
--	≡	STIR Soil Tillage Intensity Rating (v1.2)	DEPLOYED	Aug 12 2014 15:19	wlloyd	Aug 18 2014 16:31	pspicata1330	Model	csip/m/stir/1.2	csip-erosion	1.2	htt
--	≡	SCI Soil Condition Index (v1.2)	DEPLOYED	Aug 12 2014 15:16	wlloyd	Jun 02 12:49	wlloyd	Model	csip/m/sci/1.3.1	csip-erosion	1.3.1	htt
--	≡	WEPS Wind Erosion (v1.2)	DEPLOYED	Aug 12 2014 15:16	wlloyd	Aug 18 2014 16:32	pspicata1330	Model	csip/m/weps/1.2	csip-erosion	1.2	htt
--	≡	RUSLE2 Sheet/Rill Erosion (Legacy w/Logging)	DEPLOYED	Aug 12 2014 15:15	wlloyd	Aug 18 2014 16:35	pspicata1330	Model	csip/m/rusle2	csip-erosion	1.0	htt htt
--	≡	RUSLE2 Sheet/Rill Erosion (v1.2)	DEPLOYED	Aug 12 2014 15:12	wlloyd	Aug 18 2014 16:32	pspicata1330	Model	m/rusle2/1.2	csip-erosion	1.2	htt

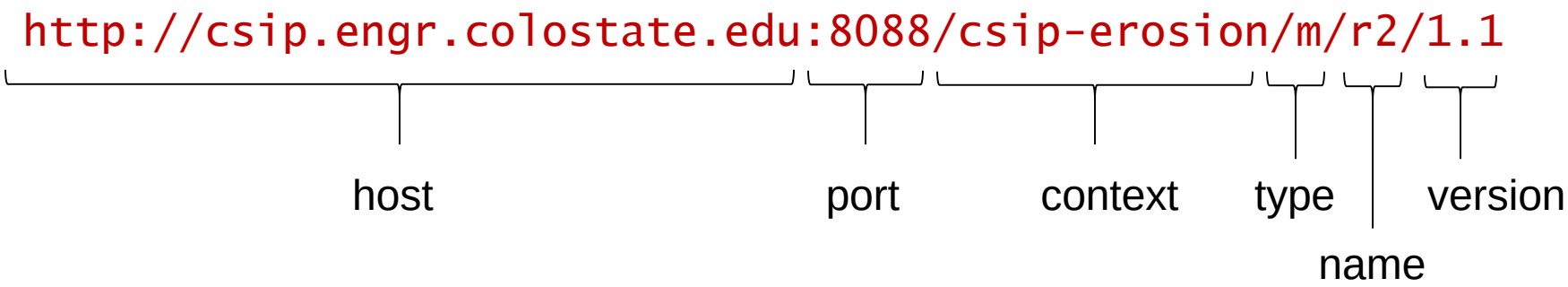
Service implementation

```
@Name(“Temperature Conversion")
@Description("Example of an simple service")
@Documentation("https://alm.engr.colostate.edu/csip")
@State(PROTOTYPE)
@License(License.GPL3)
@VersionInfo("$Id: 0.1+47 V2_0.java 4657aca8bafb 2018-08-26 od $")
@Author(name = "od", email = "<odavid@colostate.edu>", org = "CSU")
@Category("Examples")
@Category("Climate")
@Path("m/simpleservice/2.0")
public class V2_0 extends csip.ModelDataService {

    @Override
    protected void doProcess() throws Exception {
        double temp = getDoubleParam("temp");
        String un = getParamUnit("temp");
        if (un.equals("C")) {
            putResult("temp", temp * 9 / 5 + 32, "temperature", "F");
            return;
        }
        throw new ServiceException("missing unit.");
    }
}
```

Service implementation (External Model)

```
import csip.annotations.*;
import javax.ws.rs.Path;

/**
 * TR20 Service
 */
@Name("Hydrotools")
@Description("TR20")
@Path("m/tr20/1.0")
@Polling(first = 10000, next = 2000)
@Ressource(file = "/bin/lin-amd64/TR20.exe“ id=“auto”)
@OutputFiles({"*.out", "*.hyd", "*.err", "*.dbg", "stdout.txt", "stderr.txt"})
public class V1_0 extends csip.ModelDataService {
    // nothing else to do here :)
}
```

Service URL


http://csip.engr.colostate.edu:8088/csip-erosion/m/r2/1.1
host
port
context
type
version
name

CSIP JSON Response

metainfo

parameter

result


```
{
 "metainfo": {
  "status": "Finished",
  "first_poll":1000,
  "next_poll":1000,
  "suid":"c6808036-db0b-11e3-84c6-8d184928a57a",
  "tstamp": "2014-02-14T02:02:17+0000",
  "service_url": "http:\/\/localhost:8080\/csip-eft\/m\/efh2\/1.0",
  "cpu_time": 16,
  "expiration_date":"2014-05-14T02:07:17+0000"
 },
 "parameter": [
  {
   "name": "precip",
   "description": "precip",
   "unit": "inch",
   "min": "1",
   "max": "15",
   "value": 14
  },
  {
   "name": "runoffcurvenumber",
   "min": "40",
   "max": "95",
   "value": 90
   ...
 ],
 "result": [
  {
   "name": "runoff",
   "value": 12.75
  },
  {
   "name": "timeofconcentration",
   "value": 0.727178
  },
  {
   "name": "unitpeakdischarge",
   "value": 0.3700218
  }
 ]
}
```

Service Endpoint Signature

CSIP » Trackers » Services

GRAS-01b: Create Forage Inventory Site and Get Forage Suitability Group Estimated Production (FISProdFSG) #6531 v128

Extra actions... more

Tags: not added yet

Tracker:	Services	**Priority:**	Normal	**Status:**	COMPLETED
Submitted by:	wlloyd Jan 12 11:03	**Modified by:**	rumpal Jul 01 14:35	**Type:**	Data
Path:	m/gras/createfsgfis	**Context:**	csip-gras	**Version:**	1.0
Endpoints:	http://csip.engr.colostate.edu:8083/csip-gras/m/gras/createfsgfis/1.0				
Maintainers:	rob.streetman				
Website:	--	**Apps:**	--		
Test Status:	N/A	**Last Tested:**	May 31 00:50	**Test Count:**	0
Test Success Rate:	0	**Failed Tests:**	--		
Test Output:	--	**Test Again:**	http://gunnison.engr.colostate.edu:8081/job/Gras-01b_6531/build		

Relations

Description Edit

GRAS-01b: Create Forage Inventory Site and Get Forage Suitability Group Estimated Production (FISProdFSG)

This service creates one or more forage inventory sites (FISs) per requested method: (1) one area of analysis (AoA) extent FIS, (2) one or more AoA x soil mapunit polygon FISs, and (3) one or more user defined FISs. The service then derives a set of soil components from SSURGO for the AoA (usually a fenced grazing unit) and matches the forage suitability group (FSG) identifier to the identifier in ESIS to get estimated irrigated and non-irrigated forage production for the plant species and mixes associated to the FSG. This service applies to pasture and crop land uses.

Request


```
{
    "metainfo": {
    },
    "parameter": [
        {
            "name": "aoa_id",
            "value": 1,
            "description": "Area of Analysis
Identifier"
        },
        {
            "name": "aoa_geometry",
            "type": "Polygon",
            "coordinates": [
                [
                    [-97.843562, 46.527635],
                    [-97.852, 46.527635],
                    [-97.852, 46.524],
```

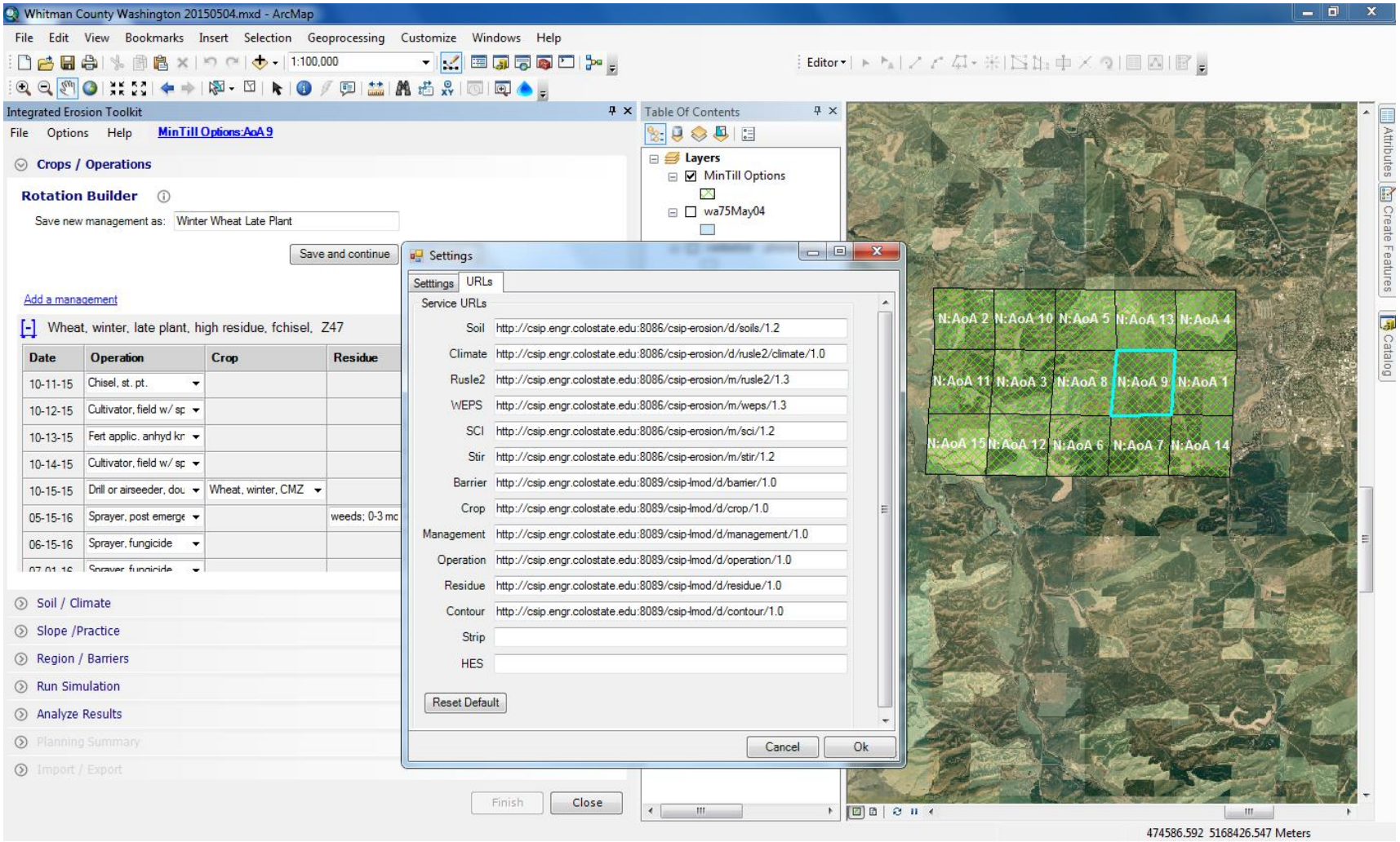

Response


```
{
    "metainfo": {
        "status": "Finished",
        "suid": "1e72f547-3fcb-11e6-a3fe-b5c7d965a8cb",
        "cloud_node": "172.1.6.59",
        "tstamp": "2016-07-01 14:33:50",
        "service_url": "http://csip.engr.colostate.edu:8092/csip-
gras/m/gras/createfsgfis/1.0",
        "request_ip": "10.84.65.39",
        "csip-gras.version": "$version: 0.4.42 74a4dc9bd7d8 2016-07-01 rumpal, built at
2016-07-01 14:04 by jenkins$",
        "csip.version": "$version: 2.1.88 984ffd7c1826 2016-06-24 wlloyd@titan, built at
2016-07-01 14:04 by jenkins$",
        "cpu_time": 7533,
        "expiration_date": "2016-07-01 14:34:00"
    },
    "parameter": [
        {
```

Applications

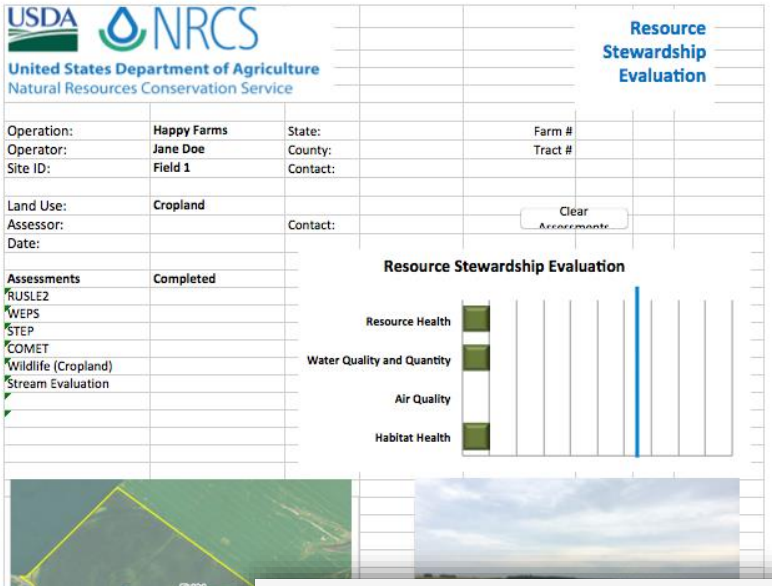
OMS/CSIP Support to NRCS: Customer Service Toolkit Integrated Erosion Tool (IET)

Services : RUSLE2, WEPS, SCI, STIR, Soil, Climate, LMOD, Input Translators deployed
Cligen, Windgen, WEPP in progress; LAMPS under discussion



OMS/CSIP Support to NRCS: Resource Stewardship Evaluation Tool (RSET)

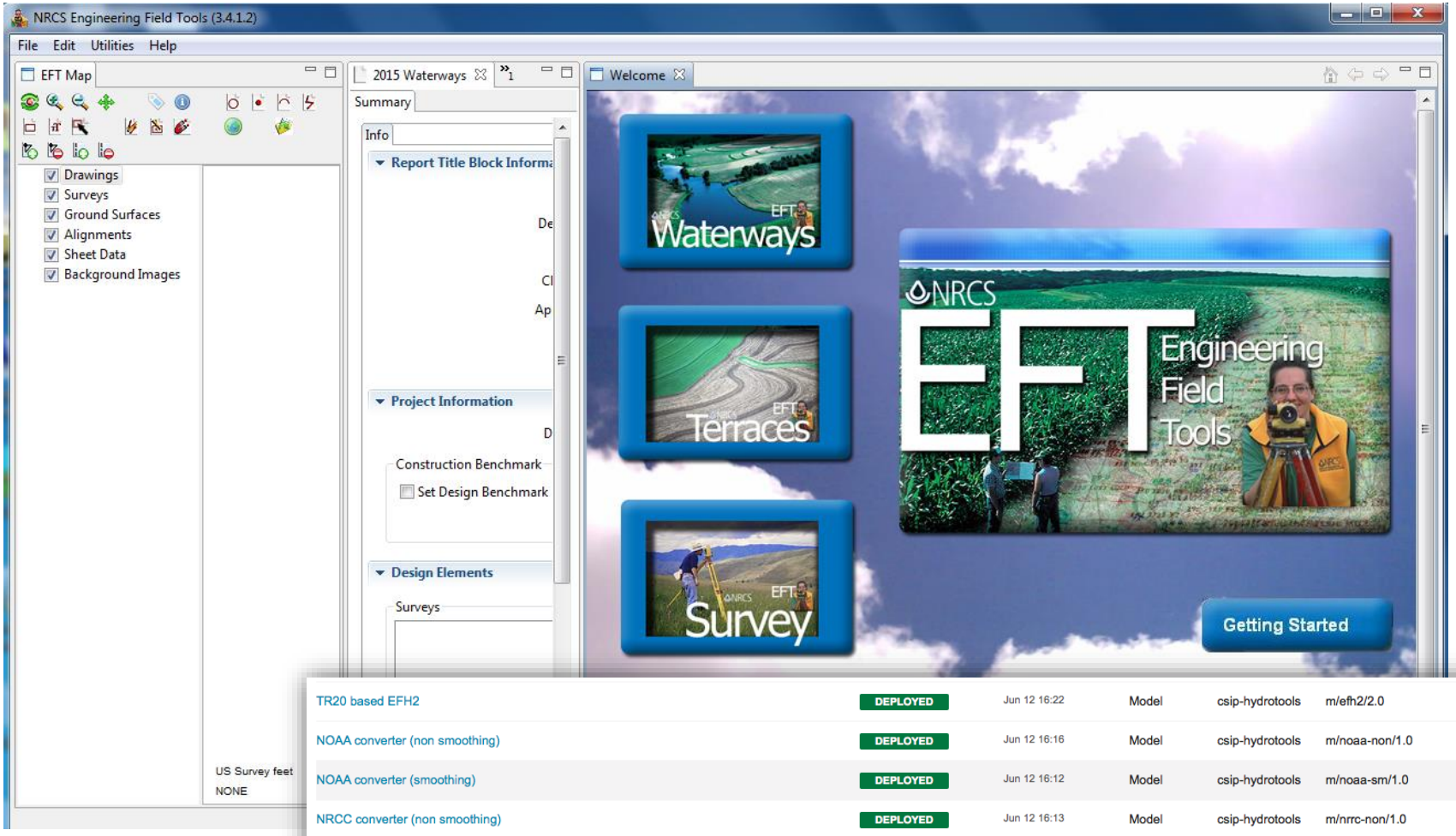
Services: WQM, GRAS-RHA, GRAS-PCS completed
STEP-Wildlife, STEP-Aquatic, Air Quality, Soil, LMOD, Climate, and simplified versions of IET water/wind erosion and SCI to be added/integrated



≡	WEPS Wind Erosion (v1.3)	DEPLOYED	Jun 20 17:17	wlloyd	Jun 22 17:11	wlloyd	Model	csip-erosion/m/weps/1.3	csip-erosion	1.3
≡	STIR Soil Tillage Intensity Rating (v1.2)	DEPLOYED	Aug 12, 2014 17:19	wlloyd	Aug 18, 2014 18:31	pspicata1330	Model	csip/m/stir/1.2	csip-erosion	1.2
≡	SCI Soil Condition Index (v1.2)	DEPLOYED	Aug 12, 2014 17:16	wlloyd	Jun 02 14:49	wlloyd	Model	csip/m/sci/1.3.1	csip-erosion	1.3.1
≡	WEPS Wind Erosion (v1.2)	DEPLOYED	Aug 12, 2014 17:16	wlloyd	Aug 18, 2014 18:32	pspicata1330	Model	csip/m/weps/1.2	csip-erosion	1.2
≡	RUSLE2 Sheet/Rill Erosion (Legacy w/Logging)	DEPLOYED	Aug 12, 2014 17:15	wlloyd	Aug 18, 2014 18:35	pspicata1330	Model	csip/m/rusle2	csip-erosion	1.0

OMS/CSIP Support to NRCS: Engineering Field Tools (EFT)

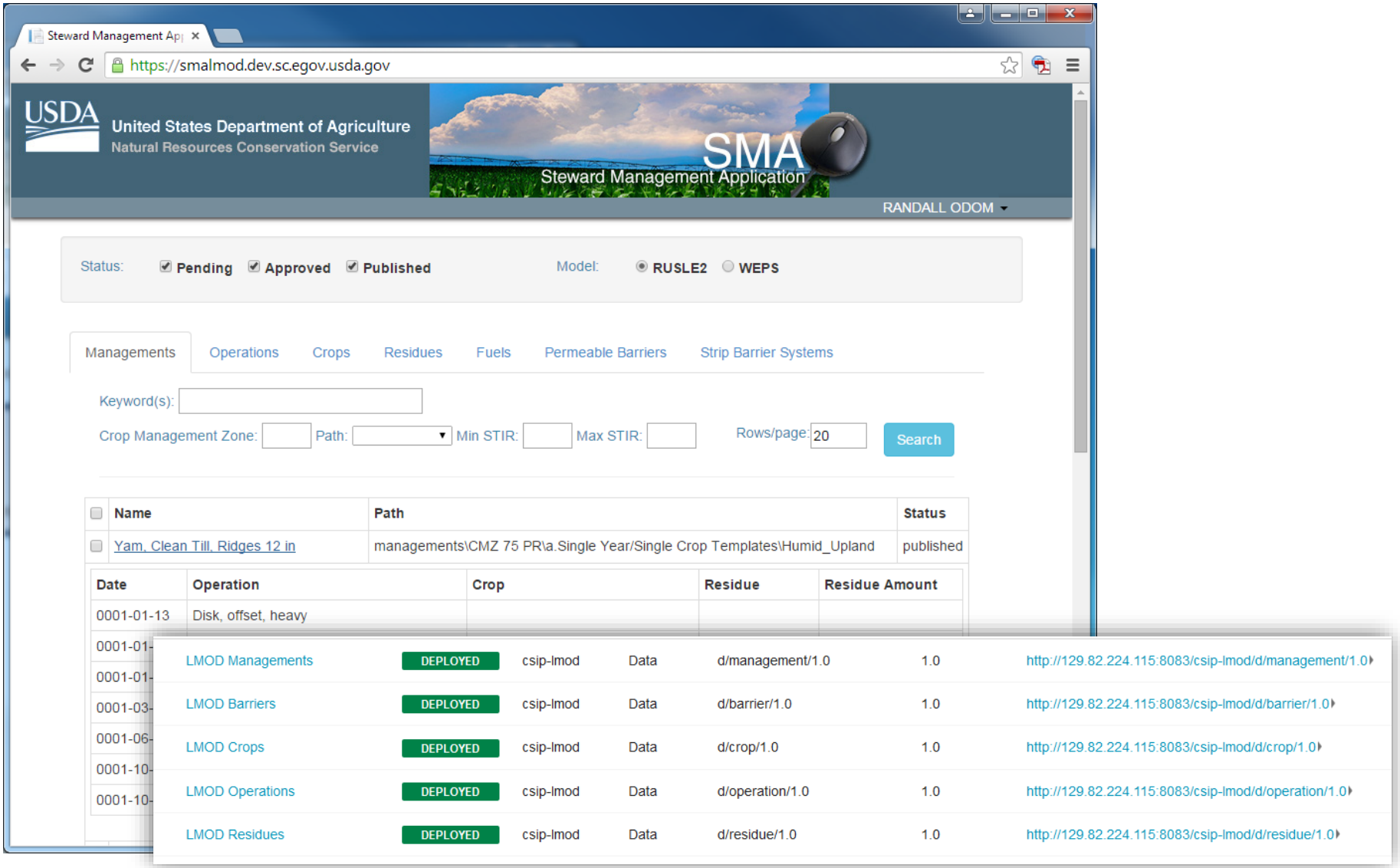
Services : NRCS HydroTools services deployed (TR20, TR55, EFH2)



TR20 based EFH2	DEPLOYED	Jun 12 16:22	Model	csip-hydrotools	m/efh2/2.0	2.0
NOAA converter (non smoothing)	DEPLOYED	Jun 12 16:16	Model	csip-hydrotools	m/noaa-non/1.0	1.0
NOAA converter (smoothing)	DEPLOYED	Jun 12 16:12	Model	csip-hydrotools	m/noaa-sm/1.0	1.0
NRCC converter (non smoothing)	DEPLOYED	Jun 12 16:13	Model	csip-hydrotools	m/nrrc-non/1.0	1.0
NRCC converter (smoothing)	DEPLOYED	Jun 12 16:14	Model	csip-hydrotools	m/nrcc-sm/1.0	1.0
HECRAS converter	DEPLOYED	Jun 12 16:10	Model	csip-hydrotools	m/hecras/1.0	1.0

OMS/CSIP Support to NRCS: LMOD

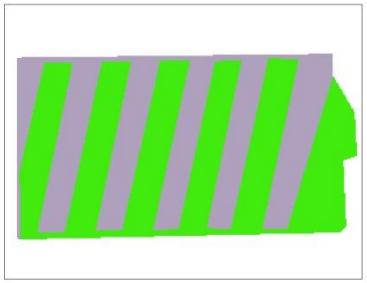
Services : LMOD, Input Translators deployed, Clients: SMA

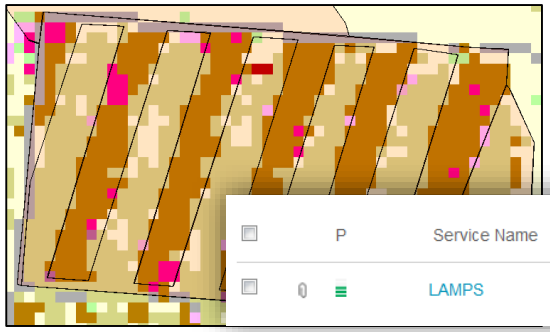


Landuse and Agricultural Management Practices web-Service (LAMPS)

LAMPS-CSIP Service Response for scott.json


```
"parameter": [{
    "name": "geometry",
    "value": “scott.kmz"
  }],
  "result": [
      …
    {
      "name": "NASS_dominant_crop.csv",
      "value": “http://csip.engr.colostate.edu:8087/csip-lamps/q/74ef0055-ea8f-11e3-b286-f554bca29d2f/NASS_dominant_crop.csv"
    },
    {
      "name": "NASS_2010.tif",
      "value": "http://csip.engr.colostate.edu:8087/csip-lamps/q/74ef0055-ea8f-11e3-b286-f554bca29d2f\/NASS_2010.tif"
    },
      …
```

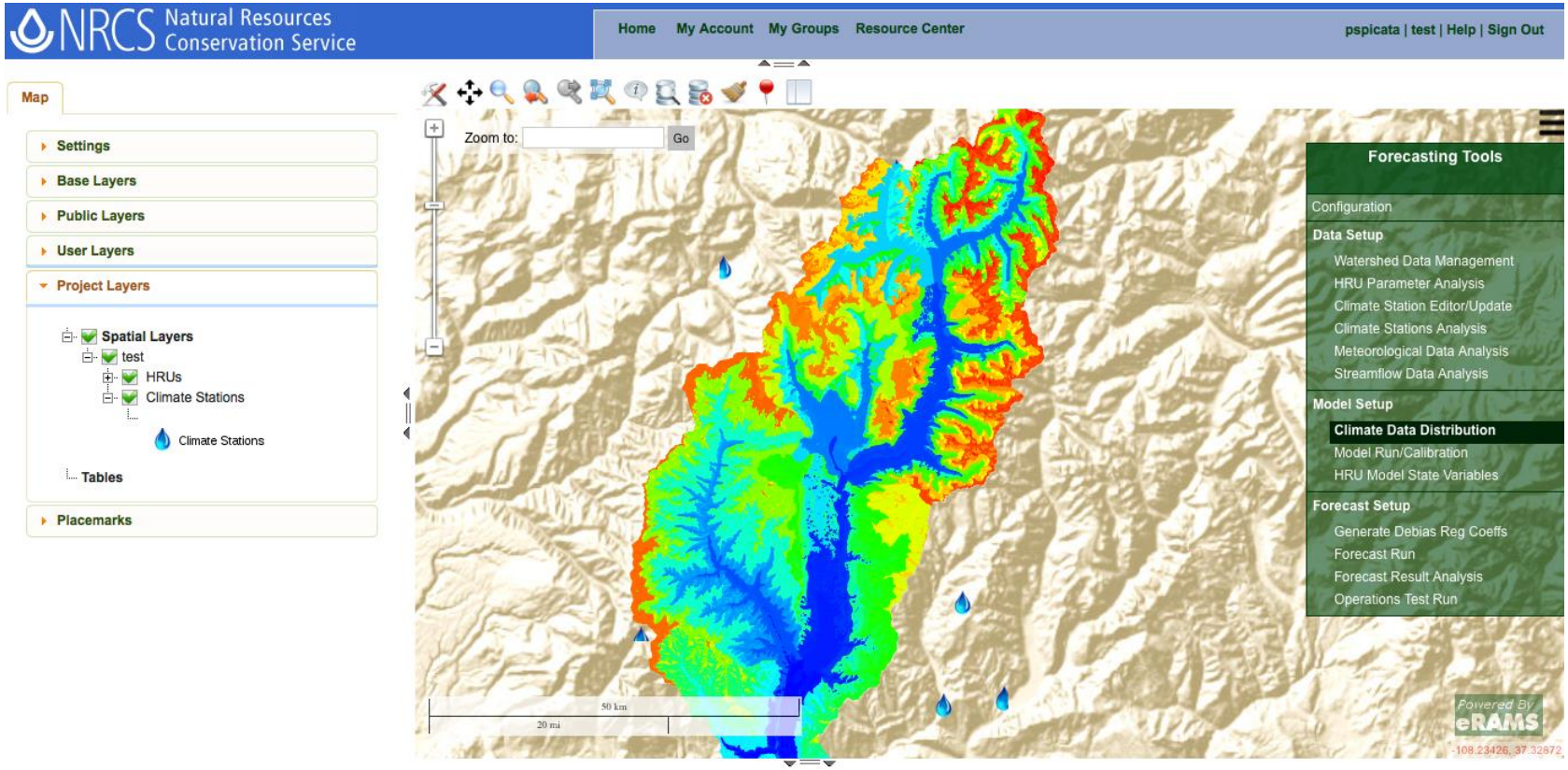


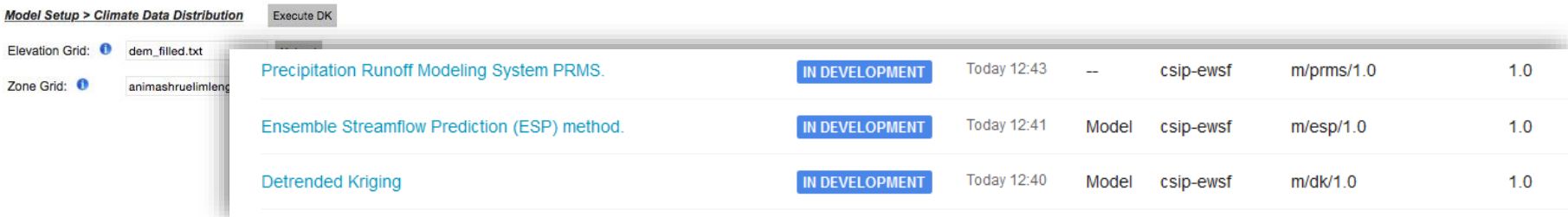
PolygonID	NASS-Year	Dominant-Crop	Confidence	Irrigated a	Irrigated Ar	2nd domi	2nd crop (
1	2008	Grass/Pasture	48	No	0	Winter W	36
1	2009	Fallow/Idle Cropland	79	No	0	Develope	4
1	2010	Winter Wheat	71	No	0	Fallow/Id	9
1	2011	Fallow/Idle Cropland	72	No	0	Grass/Pas	2
1	2012	Fallow/Idle Cropland	63	No	0	Winter W	10
1	2013	Corn	46	No	0	Sugarbee	9
2	2008	Grass/Pasture	88	No	0	Winter W	7
2	2009	Fallow/Idle Cropland	44	No	0	Winter W	19
2	2010	Fallow/Idle Cropland	70	No	0	Grass/Pas	6
2	2011	Winter Wheat	47	No	0	Grass/Pas	18

	P	Service Name	Status	Type	Path	Context	Version	Endpoints
		LAMPS	DEPLOYED	Data	m/lamps/1.0	csip-lamps	1.0	http://csip.engr.colostate.edu:8087/csip-lamps/m/lamps/1.0

OMS/CSIP Support to NRCS: Next Generation Water Supply Forecasting System (eWSF)

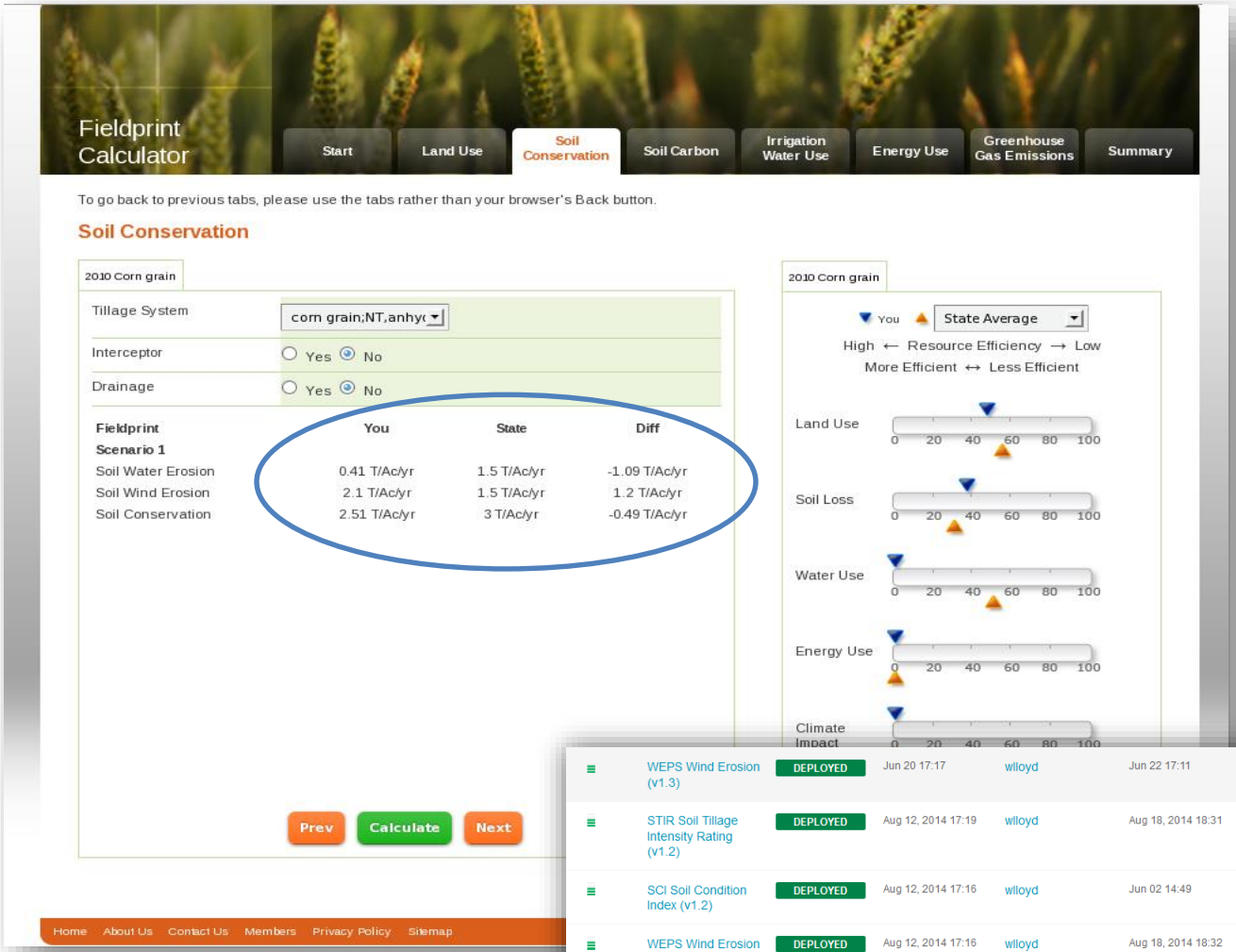
Services : Precipitation and Runoff Model (PRMS), Ensemble Streamflow Prediction (ESP), De-trended Kriging (DK), Shuffled Complex Evolution Calibration (Luca)





OMS/CSIP Support to "Field to Market" Initiative Fieldprint Calculator

Services : RUSLE2, WEPS, Climate, Soil, LMOD, Input Translators deployed



WEPS Wind Erosion (v1.3)	DEPLOYED	Jun 20 17:17	wlloyd	Jun 22 17:11	wlloyd	Model	csip-erosion/m/weps/1.3	csip-erosion	1.3
STIR Soil Tillage Intensity Rating (v1.2)	DEPLOYED	Aug 12, 2014 17:19	wlloyd	Aug 18, 2014 18:31	pspicata1330	Model	csip/m/stir/1.2	csip-erosion	1.2
SCI Soil Condition Index (v1.2)	DEPLOYED	Aug 12, 2014 17:16	wlloyd	Jun 02 14:49	wlloyd	Model	csip/m/sci/1.3.1	csip-erosion	1.3.1
WEPS Wind Erosion (v1.2)	DEPLOYED	Aug 12, 2014 17:16	wlloyd	Aug 18, 2014 18:32	pspicata1330	Model	csip/m/weps/1.2	csip-erosion	1.2
RUSLE2 Sheet/Rill Erosion (Legacy w/Logging)	DEPLOYED	Aug 12, 2014 17:15	wlloyd	Aug 18, 2014 18:35	pspicata1330	Model	csip/m/rusle2	csip-erosion	1.0

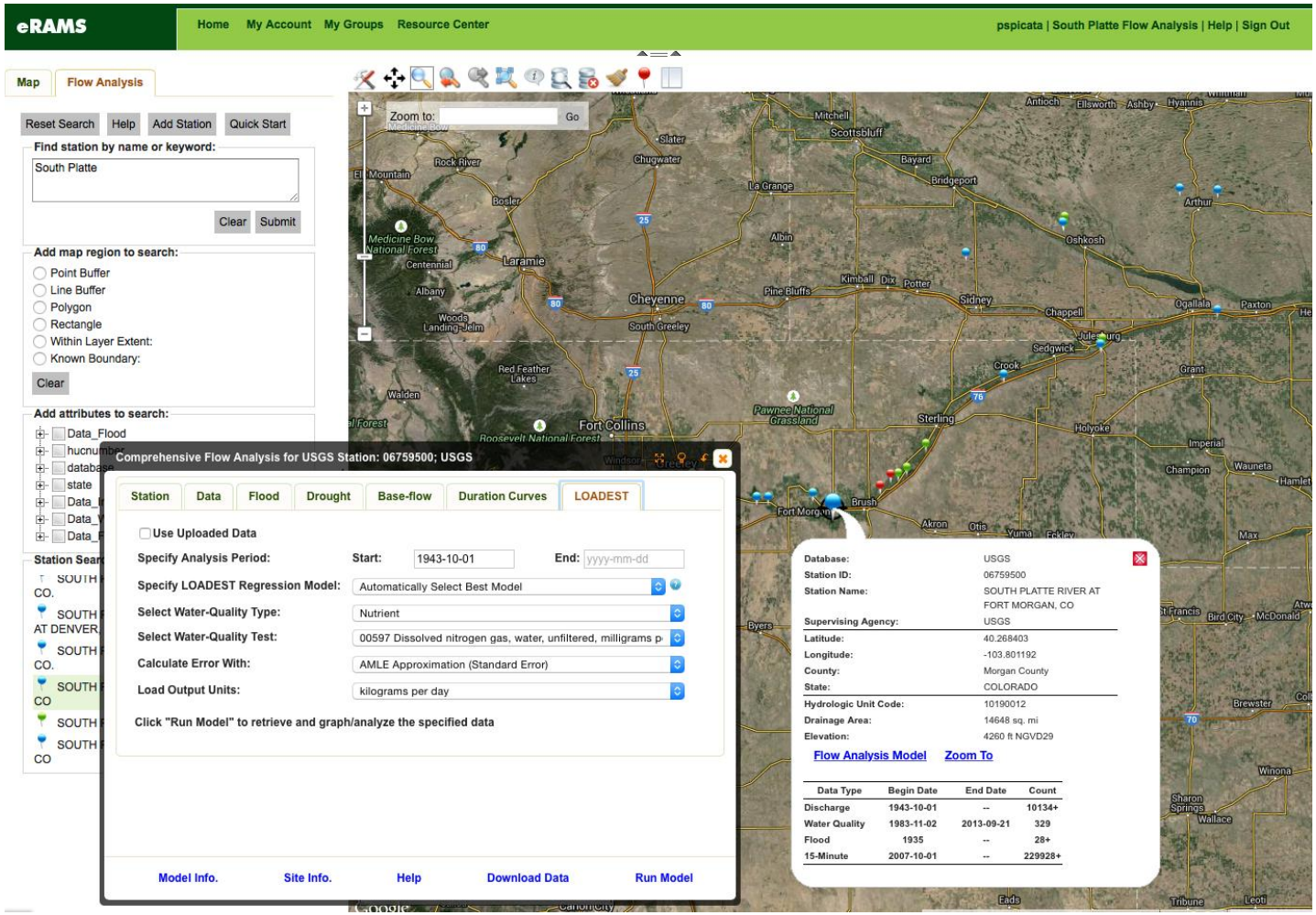
Up to 50 Million Acres to be Assessed for Sustainability in 2016

Other OMS/CSIP Services may be used by Field to Market in subsequent phases:

OMS/CSIP Support to Other Organizations: Water Management Agencies

Comprehensive Stream Flow Analysis (CFA)

Services : USGS Base Flow, Flood Flow, Drought Flow, Water Quality (LOADEST)



OMS/CSIP Support to Other Organizations

Urban Water Sustainability Research Network (6 Universities)

- Integrated Urban Water Management Model (IUWM)

The Clean Center (EPA) – Center for Comprehensive, Optimal, and Effective Abatement of Nutrients

- South Platte River Basin, Colorado
- Neuse River Basin, North Carolina

CSU Water Management Applications

- Irrigation Scheduling Using RESET Evapotranspiration Tool
- Stream Degradation Analysis (SWAT-DEG)
- Channel Cross-Section Analysis
- Colorado Groundwater Database

International Atomic Energy Agency (IAEA)

- Water Balance Modeling with Isotope Hydrology - Nile Basin

Current Work

- docker-swarm, docker-compose
- BMI

- CI Jenkins
  - Rapid model service development and deployment
  - Automated regression testing
  - VCS-based service deployment (DevOp)

Jenkins-CI

ServiceTests [Jenkins] - Google Chrome

https://alm.engr.colostate.edu/jenkins/view/ServiceTests/

Jenkins › ServiceTests

ENABLE AUTO REFRESH

- People
- Build History
- Project Relationship
- Check File Fingerprint

Build Queue

No builds in the queue.

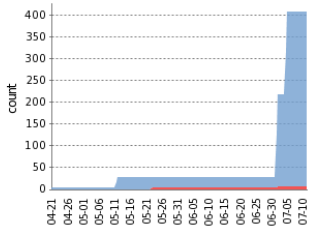
Build Executor Status

1 Idle
2 Idle

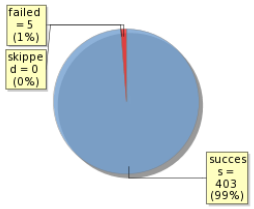
CSIP Service Tests and Statistics

All | ServiceBuilds | ServiceChecks | **ServiceTests** | Test-RSE

Test Trend Chart



Test Statistics Chart



Test Statistics Grid

Job ↓	Success #
csip-erosion tests	90
csip-example tests	0
csip-gras tests	19
csip-lmod tests	22
csip-rse tests	0
csip-wqm tests	100
Total	403

Test Job list

Project Browser | Test Result Graph [Jenkins]

https://alm.engr.colostate.edu/jenkins/view/ServiceTests/job/csip-wqm tests/test_results_analyzer/

Jenkins › ServiceTests › csip-wqm tests › Test Results Analyzer

ENABLE AUTO REFRESH

- Back to Dashboard
- Status
- Changes
- **Test Results Analyzer**

Build History trend

find

#98 - 0.3.26-2.1.88 Shaun Case 'dep:'
Jul 11, 2016 4:54 AM
#97 - 0.3.26-2.1.88 Shaun Case 'dep:'
Jul 10, 2016 4:54 AM
#96 - 0.3.26-2.1.88 Shaun Case 'dep:'
Jul 9, 2016 4:54 AM
#95 - 0.3.26-2.1.88 Shaun Case 'dep:'
Jul 8, 2016 4:54 AM
#94 - 0.3.26-2.1.88 Shaun Case 'dep:'
Jul 7, 2016 4:54 AM
#93 - 0.3.26-2.1.88 Shaun Case 'dep:'
Jul 6, 2016 4:54 AM

Options | Download Test (CSV) | Search: Test/Class/Package | Expand All | Collapse All

New Failures	Chart	See children	Build Number ⇒ Package-Class-Testmethod names	98	97	96	95	94	93
	☐	⊖	service_tests	18.915	19.316	21.918	18.486	21.878	22.981
	☐	⊖	STest	18.915	19.316	21.918	18.486	21.878	22.981
	☐		wqm01_m_wqsr_1_0__test1	0.094	0.180	0.166	0.135	0.181	0.182
	☐		wqm01_m_wqsr_1_0__test2	0.090	0.096	0.098	0.130	0.171	0.163
	☐		wqm01_m_wqsr_1_0__test3	0.090	0.094	0.112	0.123	0.100	0.107
	☐		wqm02_m_wqmsoilattributes_1_0__bug_1	2.109	1.416	1.892	1.845	2.097	1.928
	☐		wqm02_m_wqmsoilattributes_1_0__bug_2	1.172	1.439	1.609	1.705	1.929	1.523
	☐		wqm02_m_wqmsoilattributes_1_0__ser_1	0.922	0.722	1.162	0.716	1.246	1.693
	☐		wqm02_m_wqmsoilattributes_1_0__ser_2	0.719	0.775	0.922	0.717	0.974	1.012
	☐		wqm02_m_wqmsoilattributes_1_0__test_1	0.891	1.193	1.221	0.920	1.092	1.245
	☐		wqm03_m_pestprodlist_1_0__ser_1	0.066	0.040	0.042	0.034	0.038	0.044
	☐		wqm04_m_pestlosspot_1_0__bug_1	0.024	0.034	0.043	0.027	0.044	0.050

Conclusion

Conclusion

- Used by Research institutions, Government agencies, NGOs, and commercial entities.
- Deployed 250+ service endpoints of model and data services.
- Host 50+ repositories on CSU ALM for various research and service project.
- Deployment/Transition strategy.

21ST CENTURY ACHIEVEMENT AWARD

Economic Development

Moving to the Cloud

U.S. agency turns to cloud computing to increase availability of applications and lower costs.

THE NATIONAL RESOURCE CONSERVATION SERVICE was faced with some staggering figures: more than 100 scientific modeling tools deployed to each and every one of its 12,500 planners, who were spread out in more than 2,000 offices.

Each NRCS employee needs access to those applications as they travel into the field to help farmers and ranchers determine how best to handle the critical issues that affect their businesses and livelihoods.

But the NRCS, part of the U.S. Department of Agriculture, realized it had an increasingly costly and ineffective system on its hands.

THE COMPUTERWORLD HONORS PROGRAM | JUNE 2012

50

- Scalable MaaS Infrastructure for operational model/data deployment
- NRCS Science Technology Transfer Platform
- Computerworld “21st Century achievement” award for “Economic Development”

https://alm.engr.colostate.edu/cb/project/csip