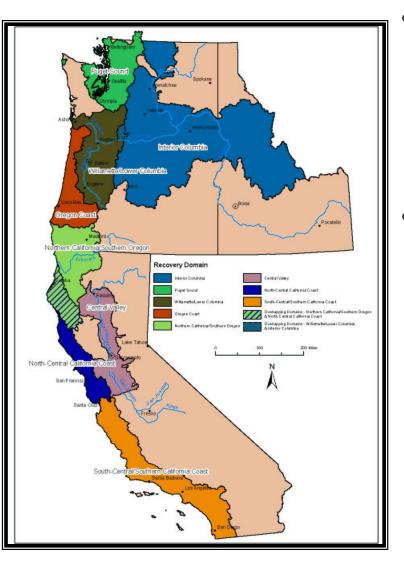
Faculty Summit2010

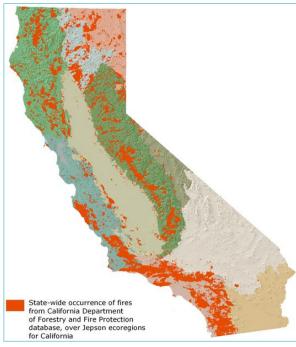
Environmental Data Management

Deb Agarwal
Berkeley Water Center - University of California and
Lawrence Berkeley National Laboratory

Global and Regional Eco-Science



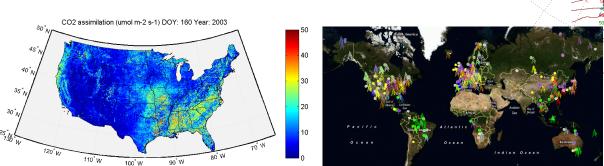
- A major shift is happening in the way eco-science is done.
 - Moving from individual studies of local processes to collaborative studies of regional and global processes. (e.g. studying the impact of climate change)
- Studying global scale environmental processes requires:
 - Integration of local, regional, and global spatial scales.
 - Integration across disciplines, e.g., climatology, hydrology, forestry, etc., and across methodologies (field observations, remote sensing, and modeling).

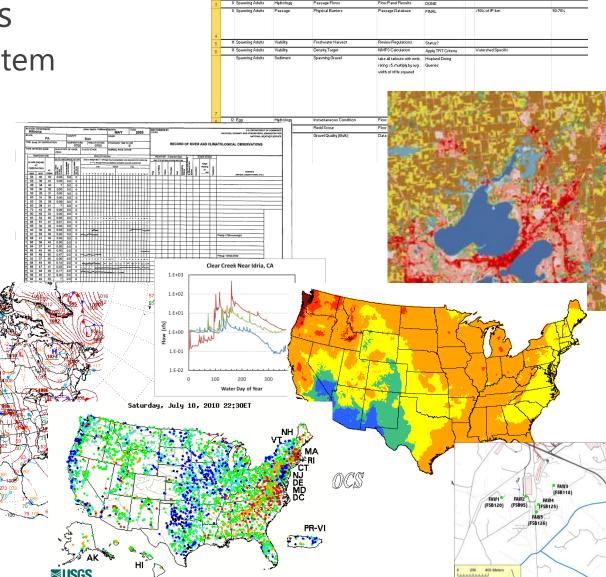




Data Rich Environment

- National and International Datasets
 - USGS National Water Information System
 - NOAA National Climatic Data Center
 - FLUXNET Network
 - Satellite data (e.g. MODIS)
- Local Datasets
 - Local Agencies
 - Companies (e.g. Timber)
 - Ecology Organizations
 - Individual Researchers

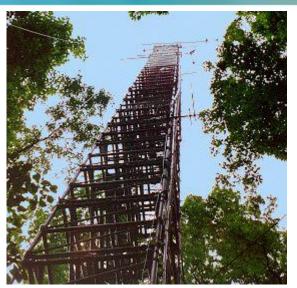




Data Comes in Many Forms



Manual Measurement



Automated Measurement



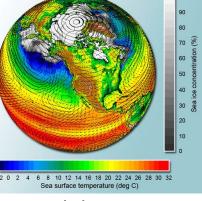
Sample Collection



Typing



Aircraft Surveys



Model Output



Counting



Historical Photographs



Satellite

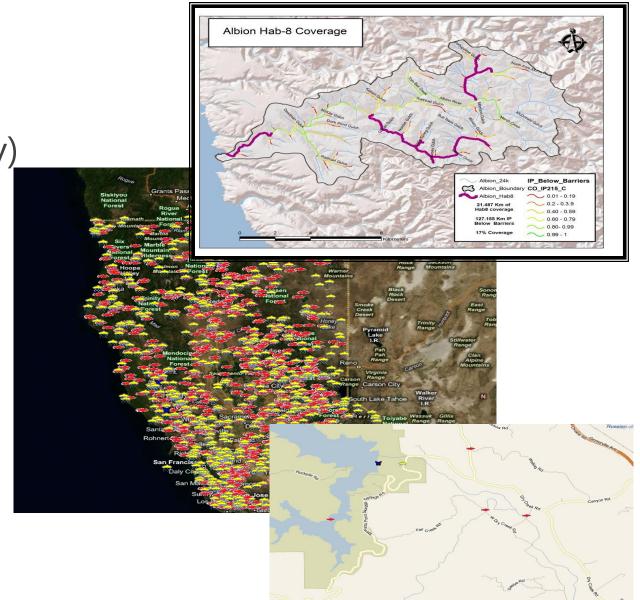
Data Synthesis – The Challenge of Bringing it all Together



USGS stream gauges
Coho presence/absence data
MODIS evapotranspiration
Cross section locations
Samples from 1997
Stream temperature gauges
Water system
Obstructions and other
Human activities

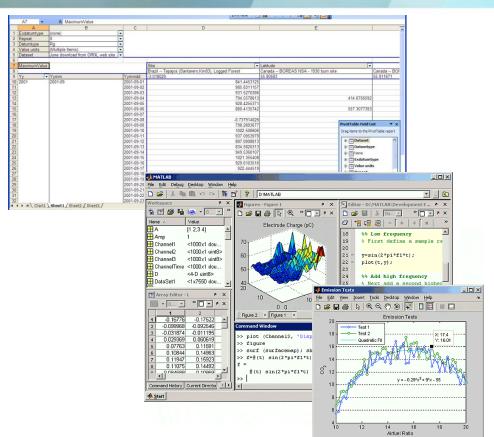
Data Integration Challenges

- Point and spatial
- Time series and low frequency
- Vocabulary meanings (ontology)
- Sparse in time, duration, or location



Data Access and Mining – Time Series Data

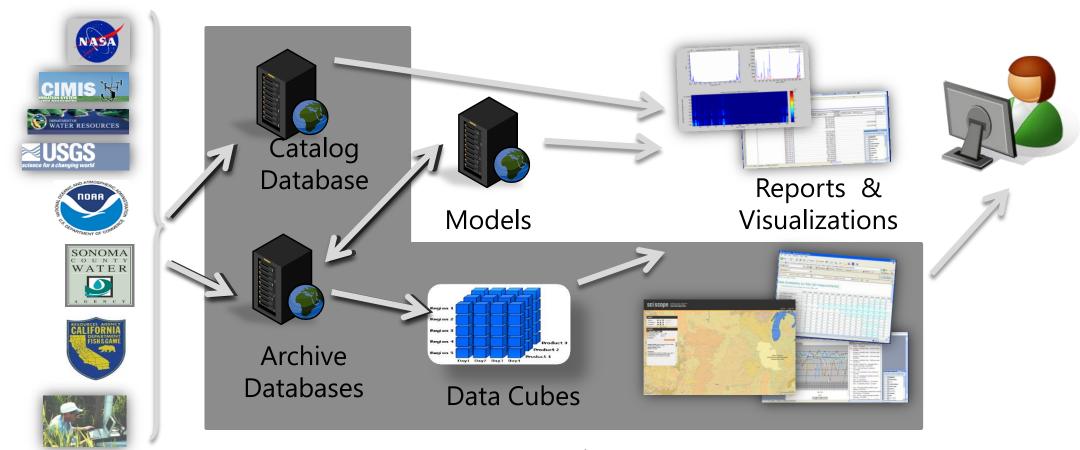
- Organize data by its natural dimensions
 - Watershed
 - Stream
 - Data type
 - Time
 - etc
- Select
 - Aggregations yearly, monthly, stream, etc
 - Filters watershed, years,
- Search for specific characteristics
- Browse and display data in the way that makes sense to the viewer



Data Analysis Infrastructure For Time Series Data

Distributed Data

Sets

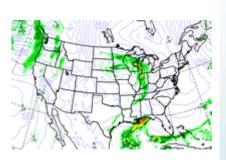


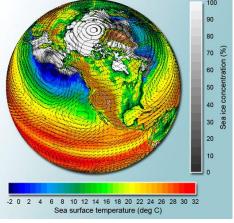
Environmental Data Server

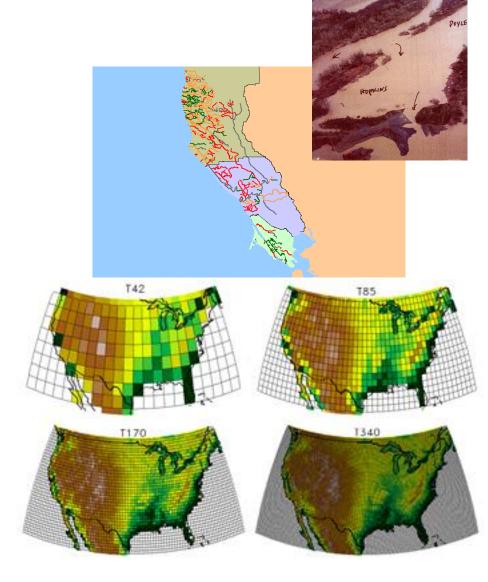
Non-Time Series Data

- One-time or infrequent event information
- Approximate measurements
- Raster images
- Photographs
- Video
- GIS information and shape files
- Model output

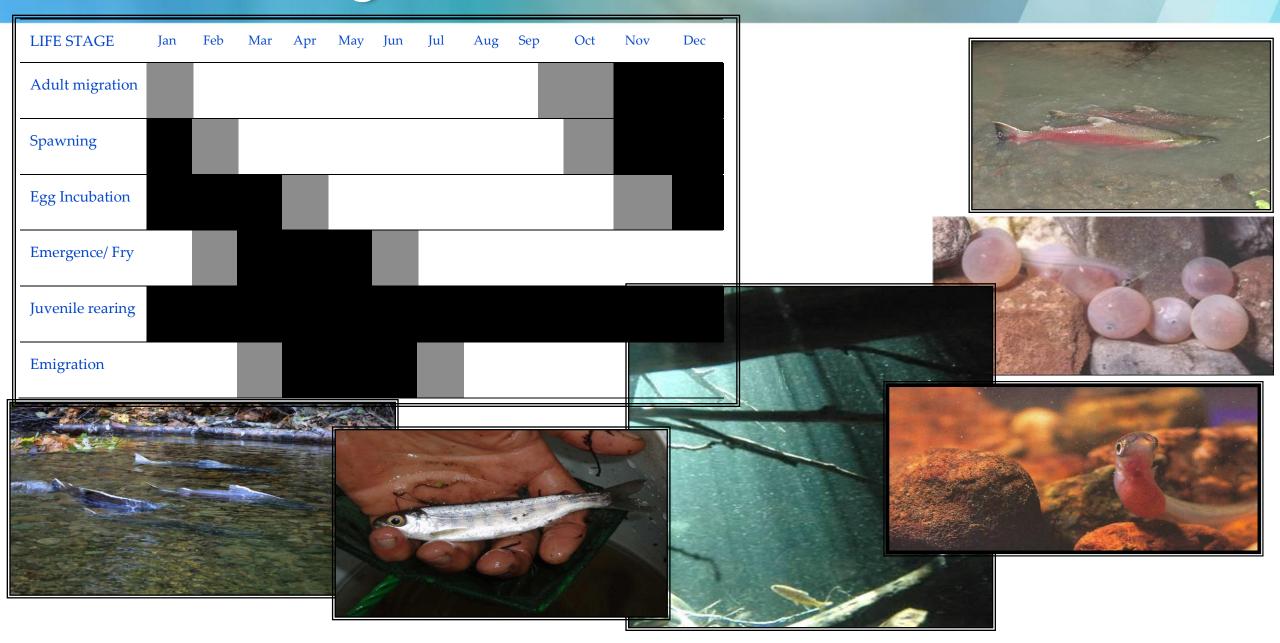








Salmon Lifestages - Different Conditions

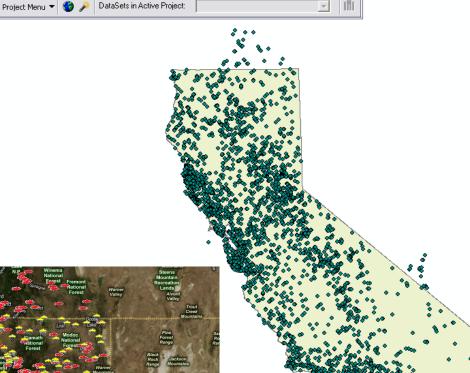


A Start on this Issue

- Mashups
 - Browsing in a geographic view
 - Overlays of rasters
 - Popups with data
- Geographic Information System (GIS)
 - Connection to time series data
 - Operate in a geographic tool

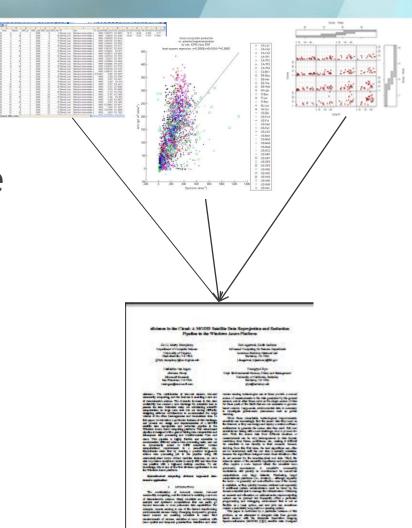






Synthesis Challenge

- Find the data needed Agency sites, individual researchers, networks, . . .
- Convert it to a format and units appropriate to the analysis
- Interpolate in space or time as needed
- Gap fill and quality assess
- Understand appropriate use and limitations
- Perform the analysis
- Gather all the 'fair-use' criteria and acknowledgments
- Publish the paper



Acknowledging Data Sources (KRIS Data)

Account N. B. (87), Onto Cred (Sig halfs inhusery project and histogradianess survey report, 31 July 1873, U.S. Experiment of the Exercit Execut Element (Copyrights), Visio, CA. 2 ye. [250](79)

Common of Educations (CERC) 1645 Continue (Fact to Super Size observed Actions 16 Continue (1645 Unidented CERC Size on Washing CERC Size (1645 Unidented CERC Size on Washing CERC Size (1645 Unidented CERC Size of Unidented CERC Size of Unidented CERC Size (1645 Unidented CERC Size of Unidented CERC Size of Unidented CERC Size (1645 Unidented CERC Size of Unidented CERC Size of Unidented CERC Size of Unidented CERC Size (1645 Unidented CERC Size of U

California Description of Fin and Garge CERG. [27]. A partial internet incomment to the Creek Society Couplings CERG report made by Warder E. Gerres, as only H.E. Rente. Yourselle, C.A. Again California Designation of Form Section (CFS) (2011) Interesting companions to W.A. Ensuring and sequence of the graphs of the Control Country Countries (CFS) makes by M.E. Designation (CFS) and the Country Countries (CFS) and the CFS (CFS) and the Countries (CFS) and the CFS (CFS) and the

Salama Personant (Finance Series 1975). 2011 Semantice transportance in W.A. Brant, regarding superior of supercentainty on Phylindrica County (I.A. Again 1997). Department CODE months of A. Parish Co. A. Sm. 1998).

Enthrol Seasons of the and large (ISS) for softine correspondence in W.A. Even, reporting map that covered proper on higher lower, because Drawy Unput and CDFD covers by W.E. Farmer Years (I.S.) and (ISS) for the control of the con Cultural Department of for any Dates (CED), 2013. Depart for correspondence or W.A. Erran, regarding usage first control project forces a County electric closuring nativey. August 15-01, 1901 (Region, Maximum, Sources and Bry Chefa), Unpublished CED control (Sept. Tenter County) in Control (Sept. County).

California Department of Fath and Garter (CETA), 1974, Eig Majour Cress (Rasses Stress Indiance) dield com. 34 March 1974 Capabilished CETA die meine by M.E. Facille Youwerlie, CA. 1 p. (2005)*** Delivers December of Fig. and Game (CCFG): 1974. Colores Credit (Fina Credit objecty) field sole, M July 1974. Uspatibles CDFG file ments by M.E. Freite: Yourselle, CA. 1 p. [478]* California Department of Format Game (CEO) 1854. Fell Cress (Semina Free Volume), field come, September 1954. CEPG completioned the memority W. Erman and M.E. Rodier, Volume G.A. Ly. (1960)

College Department of Fact and Game (CEP), 1854. Recycle Creek Seld one regarding Demonstrationers for rough fact control, 50 Reportment CEPO Section 1970 Sectio California Department of Ent and June (CEE): 16th Green Valley Creek, Institute Coulty, Seld-care, 29 Impendion 18th regarding chemical instrument for rough flat current. Copyrights (CEE) file memory H.E. Parley Visconia, CA. Lip (Station

Column December of the and Gene (CDE). (It's National Deep Space Stew releases) field one from \$10 and \$10 A December CDE Steward completely \$10 and \$10 A December CDE Steward CDE Steward St Column Teachment (Fall and Sang 1975). 1914. Motive Cred Self and 17 September 1914. Red core reporting cliented between Unpublished COTO Sin cred by MET. Parker Transfelf CA. 1 p. (1985)**

Column Teachment from and Care 1975: 1914. Mill Cred (Susan Key Inbury) Self-core. September 1914. CETO copulation of a control by MET. Parker Transfelf. CA. 1 p. (1985)** California Department of Fair and Game (CEFG): 1954. Shortless Comp field now. If September 1954, regarding much fair control. Unpublished CEFG file researchy H.E. Forthe: Valuation. CE. 1 y (ADE)** Catherina Department of Face and Department of Face (CEFS), 1962, Ownel sections on opening day of word reason, April 20, 1962 for four owners on Southern County, Congression of CEFS covers by M.E. Fortier, Yourselle, CA, 4-year

Indiana Department of Fall and Date (CDFS). 1915. Felic Cresi (Rassian Kew robustry), Settlemen, July 1914 and August 1914. CDFS uspublished the means by H.R. Forter. Viscordin, CA. 1 y 15500. California Department of Fick and Games (CDFG), 2917. Recognis Overall field novel, Counter 1904, August 1905, and August 1907. Virgonizated CDFG file memority IEEE Primer Transmitte, Call 19. (2005)**

Common Consumer of Fall and Consum (CES) 1923 Steen in C.K. Falser regarding Big Sulptur population trough common 19 September 1923. Unpublished CEPS His memor by A.F. Ervell. Your-rise, C.A. Lyan Albertan.

California Description of Rain and Games (CDRG): 1855, State Clean (Day Clean Schwarz); Mandestern Cowney; Held som: Unpublished CDRG file manus. You cride: CA. 1 p. (1986)* to Description of Salt and Carry (CPS), 1919. Ordered Once Date Control observed communication of Salatan 1919 Montained CPS (Salatan CPS) (Salatan CPS) (Salatan CPS) (Salatan CPS) (Salatan CPS) (Salatan CPS)

Column Describes of February Control (1979), 1979. Type Cred (then Cred (then Cred (then prop)) areas survey. If July 1979, Uspationed CDFS (the ment by G. Halman, Yasardin, CA. Typ. (1978).)** Cultural Decorps of Rolland Garce (CRG), 1939 Please Cred Research Street Hospital current Copylished (CRG file memo Yournife CA See (CRG)***

Column Description of Fair and Description (CDF). (HT) Offices the Offices Control Description (Control Description) of the CDFO complicated the means by 1.8. Day. Yes, (1980) Subman Securior of Grant Security (E.M.). Names of love (Security of Security of Security

Cultura Parameter (File and East 1995). [15], Sujean Cree and Villay Sone States (Five village) uses a comp. If has 340 Vigoritates (CFA States and Villay) and a comp. If has 340 Vigoritates (CFA States and Villay) and the state of the states (Fig. 2) and the states (Fi Collision Season of Fall and Sans (CER): (HI), Maryine Creek (West Brain Rosein Rose orbitary) orans carry; 12 February (HI). CERS orpotated the menuty N.C. Hause. Viscosite. CA. 1 pp.

Delivery Description of Not and Game (CDS). 1955 By Car Cont. (That Cont. otherwise Of August 1955 Unsatisfact CDS As seems to E.R.) Stocks Viscosite CA. In 1250/19

na Description of Estimated States (CERS), 1900. Manager Comp. States from reliable transport managements. Description CERS file record Valuable CA. Soc. C 1900/09 Continue Description and Suggest TODS, 1986 Count Own Transformations New relating parents covery. If Nation 1986 COPO associated the country W. Breau Vincentia CA. Log. (1984)** Delivers Described of this and Described (1995). 1995 Pale Original Reservoirs (1995) and the control of the Pale Original Reservoirs (1995) applicated the control to W. Brass and H.E. Freier Vascotte, CA. Let 1990).

Indiana Department of Fig. and Garge (CDF). 1995. Research Contr. Statute Electrology, means, survey. 54 March 1966. Department CDFS the cases. Visuarchia, CA. Log. (CDR)= na Departmental Fig. and Same (CERS), 1916. Stania Cress (Susian Arres adulary) stream survey. If February 1916. CERS supporting the means by S.K. Bresten Youwick, C.A. Lyg. (1936)** Continue Department of Face and Searce (CDSS), 1995. Nack West Cleans Street obstance convert convert Not 1997. Unpublished CDPG file means by C. Culter, Vesserick, C.A. Face Cl. 1995. belling Description of Sale of Dane (DD). Het Sale Dest (Des Sales Sales Sales Sales Sales Sales Sales Des (DD) application of Sales DD)

Calchesia Concentratifica and Same (CENS). 1991. Big Suprise Credit Security Separation (FE). Separation (FE California Description of Description (CDD) 1911, Commonly Ower common I represent 1911, Sugar Requestion, common laws 12 September 1911 CDD unjudicional file common by ED Dates.
Transmitted A. Let 1986/201

Colomo Decremental Francis Company (CDF), 1911. Natural Company Company of the recognition of the company of th

Communication of State (CCS): 197. See See Seenal season: September 1981, sept September 1981 approximation of the CCS separate 1981 CCS s Colleges Connected for any James (CCC). [26]. Eig Super Cree Clauses fore robusy) feet one. August September [26] exclude population entries. Copulation CCCO the news by T. James Visconite. (A. Lee 1970)**

California Description of the and these (CDE) (DM). Big higher Credit Statist New privacy) this and find that argument survey. New 2005, memor in Segment Water Quality Council Statist Copyrights (CDE) the interest Transfer Col. I for CREDITY. College Description of Fig. and Game (CDFG). (FEE Significance Ores) Support or resonance of Associated CDFG fig. ores. Trust Co. 4 or 1952(1) Chimal Sparsman of the addition 1992, 1971, these level discharge consistency (seen one-up) of algorith Capitales (EV) for some of a 1992 (2007).

Chimal Sparsman of the addition 1992, 1971, these level discharge consistency (seen one-up) of algorithm CDV for some 1992, the 2017 (2007).

Chimal Sparsman of the addition 1992, 1992 (see layer to the figure consistency own one-up, support to Capitales CDV for some 1992, 1992 (see layer to 1992).

Chimal Sparsman of the addition 1992, 1992 (see layer to 1992) (see layer to 1

Colores Description of Eq. and Description (CEP): 1844. Noncession in R. Word, regarding presents of the nation in Research Series Sensor, 10 Coulor 1846. Unphilished CEP Of the mental by S. Minter, Vineralia, C.A. Top. (1986)** Onlinea December (Funds Date (CDD), 1995, George Young Deep size Merces Deep (Insue) Deep relating December 1999, 12 May 1999. Unpublished CDFD Six messs. Yourselfe, CA 1 yes (1998) Salama December of Eq. and Same (CDS). (Add. Own Valley Steel, Sames New Yorks) owns saver, No. (Add Steel) Salama (CDS) in owns. You will be (CDS) in owns.

Cathona Department of this and Same (CDS): 1871 Ministratives (Sustan Kirler Schustery) stream survey, 35 May 1870. Department CDS Sie manne. Transfella CA Typ. (1906)** Coloma December of Fig. and Secte (CDS), [27], Man Wes Over (Busses Fire Industry) seven survey, August 2715. Department CDFS file memory B, Klaim Touriste, CA. + ye. [1630]** California Department (No and Gener (CDS)). [87] Equipp Out of (Non-Record press) of how [87] Unpublished (CDS) for exercising Kines Viscosite CA 4 or (CDS) Column Extraction Column (2012), 22, American Column (2012), 23, American Column (2012), 24, American (2012), 24, America

Collines Description of Section (CCS), 1977, Not Sents Cred (Served Cred, Sents Succes Succes, Serve obscury) or sent curvey; 2f Succes To Opposition of CDFS (Sentence Styl), Karel Version CA Co. Carlina Department for any house COSTS, 1973, Service Owek (obstance) or Foundational covery, 17 April 1772 Topolished COSTS for meany Transmitted to 1997, 1972 Cathonic Department of Fig. and Series (1995). 1971. Wider Ores) between the French Ores) common curves. 25 has 1971. Unpublished 1995 the manne. Visuandia Ca. 2 or 1990. California Especialist (Especial Control Con

Column Description of Format Carrier (1997), 1971, Four Creek (Basins Free House), mean survey, 17 19 August 1977. Uspitalised CDES the means Tournille, CA. Spp. (1785) Continue Description and Same (CDS): 1971. Frame Continue CONTINUE

Confirms Described (Facing Same CDS): 1911 Statutes See States Fire International Language Language CDS Service CDS Service CA for POST Administration of the conference of the conferen California December of Salvard Carpa (1955), 1971, Religion Creek Studies From relevant correct 17 hely 1971, Copplianted CEPG file manne by B Selection Transfer, CA. Log. (1950). Collision Department of Fig. and Game (CDFG): 1774. More Cred Crede (Sussan Street Obstany) present convey; 19 August 1974. CDFG oppositions file creates by 1 Broat. Transmille, CA. Sign. (1986a). Colors Department of the and Garage (CDD). (It's Lease of Like State of purples or employees of both the Earth of the Enters Day (CDD) appropriate the enterty CDD copyright CA.

Combined Resources of five and Cases (CCC). 1712. Divers on CCC's Devicement Services, Ragion 1, from CCC's There Quality Laboratory - Resolts of Amendment Constitution on the Constitution of Amendment Constitution on the Constitution of California Desarrates of Face and Garden (2016). (Pile Fine Costs) Ratios Fire Indiany, orient survey. D. 13 September 1974. CDFD unpublished for memory 1 Seven Towards. CA. Typ. (1982)***

Collision Decrement of fine and Danie (TEC). If the Creek Plan Creek Residents from others by Steam Town House, 11 II September 174. Upperhase COFS the menu. Thursda C.S. 199 [Million California Department of Fair and Game (CDS). 1911 Sig Salote: Deep Studies Free volument green survey. 13 April 1911 Capabilities CDSS die overs Traverille CA 1 or 1980 CD

Collision Description of Fish and Game (CDFG), 1915, Correction Creek Chassin Street Monary) communicatives; 11 January 1916, Cognitioned CDFG the communication CA 3 pp. (1986) Column December of Fair and Garner (CES), 1975. Green Valley Creek (Sustain Surve Schulzey) press number, 22 December 1975. CEPG appointment file memo. Valuarities CA. 3 pp. (1456)** Collines Described Fast and Octor (CES), 17% More from EX Years, 35 Conter SP1, regarding reported at the content More Resources and Engineering Development, Inc. Salmon making produces Described Action Security Contents Content Contents (CES) (Security Contents Contents Contents Contents Contents Contents Contents Contents Contents (CES) (Security Contents Contents Contents (CES) (Security Contents Contents Contents (CES) (Security Contents Contents (CES) (Security Contents Contents (CES) (Security Contents Contents (CES) (Security Contents (CES) (Sec Sufficient Description and Super (CES). USEs these contracting described expges sampling on Associative Cests in visiony of Salamagol applic canonics, I have SPS. Upperbased CESS means by J. Leedense. Towards CA. Let 2002***

tions Described of Robard Spine (CDR): 1911 See Fel Cred Six Associated robusts spines spines (2011) Undivided CDRS Services A Spines Visionia CA 2 or 12561

Company of Express of Express (CES): 1971 But Serv depth Apple Apple Apple (Apple Depth Apple SET) Company of Express (CES) Services (CES) Se

throw December of Fig. and Game (CDF): 1971. Oliman das Offices Cresi Stan Austri Cresi objectly install survey. 15 August 1977. Copiditated CDFO the memority A. Barason. Yours Ca. L. Lop

a Department of Fig. and Garra (CDFQ) 1977 East Creat (Austr Oracle States) communicated 1977 Should sheet CDFQ (in many lot A States) Vision in CA State (1990) College Section (1997) | College Section (1997

College Communication and Associated Service College C

Collines Department of the and large (CDS), 1981, but their Owe Turber Ramon Flux 1-11-174) commons. Our billions CDFG ramon or S. Inhouse, Carbona Department of Source, by N.J. Nove. Turber Cd. Lot. 1987. max Construct of Est and Gazza (CCEG), 1991, Normal of Worker X. Content regarding Nate Over deviating 01 beyondow 1991. Unput listed CCEG means by S. Con. You mile, CA. 2 ye; (1985)*** three Department of Fair and Garrier (CDFG). [HE]. Deliverar Creek observe revenancies, preliminary assessment Uncobinded CDFG memor by W. Song Viscordin, CA. Eur. [2020]

Tomas Consumers of Fair and Garder (COFG): [HE], East Fair Resident Report Control Copyring Courts, 18 (Apr.) (HE). Unpublished COFG for many by L. West, Yourselle, CA. Copy. (1900).

to December of No. and David (CDE). 1899 Stude New Sci. condense superv. 25 Contac 1899 Condense CDES No. com. Viscontac CA, 21 or 1999 No.

hour December of First and Grove (COPS), [191]. Notes in J. Englanding describing in Racins Rev., 13 May (191). Deputition COPS memority W. Innex. Yourselfe, CA. Ly. (En). has Assessed Face (See 1975). [10]. Event Des Asses Nove sharp commune, Li Fossey (M). Deplated (SF) de nominy É Asses Nove (A. Lyg. (10)).

Assessed Face (See 1975). [10]. Event I Sharmond (T) soon more or hallon (See 1975) (M). Deplated (SF) de new (See 1975).

Asses (See 1975). [10]. Deplated (See 1975). [10]. Deplated (See 1975). [10]. Deplated (See 1975). [10]. Deplated (See 1975).

Benefit (See 1975). [10]. Deplated tons Department of the and Sante (1995), 1991, Green Valey Code (release) or Receive Severalizing result. 17 October 1991, Vaccificated COPO the steem Vaccific CA. Sup. (1991)

California Tapper visit of the and Lance (TTV), 1000, Residen from Tested Residence Flate - Ady 2000 Death - Strongal aution of the determinent are Solder Cony (TDPS), Santa National Pierrie (TDPS), and Total Residence (TDPS), Santa National Pierrie (TDPS), and Total Residence (TDPS).

Column Design of Eat and Garra (CDE), 1915. Coli Desig (Early and Easing Rev) press parent. If his 1915 Unphidded CDES (Se name by L. Basserier, Yourselfe, CA. Lee (1996)) Software Entered on the confidence (CESS). (EV). Moreover these is a fasterior of the (includes on Sausan Cone) for consumpressed of September (EV). Operation of CESS (September 120), and the september (CESS) (September 120), and the septem

Change of D. 1992 Early conditions and history of the Union Regain Firm Manderson County Widor Agency 15 on 122(20)**

Econolics (100) Resear Ever Ecological Assessment - Leavier Expect) Food count operations in Coyone Walley and Water Springs Distract Responsible U.S. Among Copy of Engineers, the Research Distract Approxy Telescolorum CA. 107-56 (1986) Into In. 2005. Basin for Bringist Assures: Servin Report Hydroteons projets species. Preparal for UA Army Copy of Engineer, Institute District and Investor Copy Water Agency, Wilson Copy, CA, 41 pp. (2006)

Employ 2001, Bases New Enterpris Assessment Lewin Report Water apply and Several Relians Respond for U.S. Army Tops of Engineers. See Francisco Continued Section United Section 1990 (1990).

The Continued Section 1990 (1990). Local Sci. 2001. Bases from Estimate Assessment - Local Report Classes mannesses Proposed for CLE Army Corps of Engineers, law Familian Discovered Instance Concept Wine Agency Wines Corps. DA. 171 on 1955. Emiliar 2001, Basins five Dissipat Assumes: Lemin Report Technism and occurrence actions Despired for U.S. Army Copy of Engineers, fair Engineers Desires Desires and focus on County Time Aspecty.

Termination Co. 1015 (1904)

Intelligenty Description Assessment Service Report Research Page Responsibilities for Anny Description Error has 100°, Raman New Enrighed Assessment - Allerstrees Destates of management action. Engaged the U.S. Assey Copy of Engagemen, line Features Distort and Souther County Water Agency Waters Come. CA. 1879; S. Y. Nall, Phys. Addresses and Assessment County Water Agency Waters.

Low Dot 2006 Standar Series Sumport Assessment - Lower Report Port-related tablest Prepared for U.S. Avery Corp. of Express, San Francisco Discretal Source County When Aspects, Winter Cost, 256 or 1, 250 Employ on Facility Societies (Inc. Section From Endograf January on Section Report For Endograf Societies (Inc. Cont.) The Appropriate (Inc. Cont.) The Property of Engineers, Inc. Processor Decision and Societies (Inc. Cont.) The Appropriate (Inc.

Falson Los: 446 Erons Los: 2000, Harchery and pariety management plans for facility productor facilities - colo administration of management for U.S. Army Corps of Engineers. See Francisco District.
National Nation States Service, and Cartherin Department of Foll and Gazen by Ringer, Ear is association with Energy David, Cart. Waters Corps., CA. 127-59. (9-2002) States, F. and T. Karr, 1995. Passing New strang and 1995-1995. Frequent for Engineers of Flavorag, Institute Group and California from Control Strang Control Strange Control

Street St. 1972 Notice Code (Mill Code School) (Spring and Additional School) (Spring St. 1972 VI. Cognition of the School Chees, of Load Management, Cognitional, Visio, CA. 2 pp. 1773 Co. 1972 VI. Cognition of the School Chees, of Load Management, Cognitional, Visio, CA. 2 pp. 1773 Co. 1972 VI. Cognition of the School Chees, of Load Management, Cognitional, Visio, CA. 2 pp. 1773 Co. 1972 VI. Cognition of the School Chees, of Load Management, Cognition of the School Chees, Chees,

Street, B. L. 1972, National Dieses, Olds Cleans, individually physical and training places in security region, IP March 1975, U.S. Department of the Tomaton, art Land Management, Copyrights (C. Dan, CA. 2 ye). 1773-1784

Street Law Minister Case, Repeated the Colorium Case Design For released for released popular and honograph owner survey again, 13 September 1975 TR. Department for Service Design of Land August 1975 Transported Completed Service Law 2010 Colorium Case, 1975 Transported Completed Service Law 2010 Colorium Case, 1975 Transported Colorium Case, 1975

Name 8 L 1972 Norman Cred (Bassa Kee inhost) physical and hological press not by equity 22 Control 1975 U.S. Department of the Survey of Lend Stategarders (Department of Department of the Survey of Lend Stategarders (Department of Survey) (Survey) (Survey TV 0.100° A progress region on the Research Drew fair population usaby 1974-1976 California Degranae of Fair and Games Inhand Fairwise Administrative Report on 17-16 September CA 17-pp [4107]* Section 1.1. 1974 has been their physical action produces in some values of Part 1974. The Separation of the Species Storage over Computation. This CA. Typ. (1706)** Millions O 1991 Performance was no Record Rev Performed Specialists County Stems Acres Regions according to being Specialists 11 1991 where Keep Cell Stew Million Stems County Specialists (County Specialist

Excite The blood Autocome 2011. That Report East Auton Ones Westeland English Council and Permission Project, ECT 1 State Organishes and Decommissioning Project Programs for California and Server California Department of Facts and Reports of California and Server California Department of Facts and Reports of California and Server California Department of Facts and Reports of California and Server California Department of Facts and Reports of California and Server California Department of Facts and Reports of California and Server California and

Palls Villans & Associate Let 2014. HE Upper Security in operation recognition (Security England for Management Letter Agency by FVA with Cornel Rate Productions. Lett. A.A. Sub-and Associates Control Culture & Associates (Security Security Secur Secure Nanascreti Associate Inc. 2001 MED Of procusion of view quality in the Russia River basis. Prepared for Sociate Crossy Water Agency, Succe Cop., CA. 95 pp. [2.1505].

Line | B. and W. M. Brown. 1871. DeVolky and supervised resignment to Residue Directions. Distribute U.S. Department of the Territor. Designed Survey - When Territoria. Director Field. CA. 2021

haur gir. L. Des Preiminary report on the Sideries of the Sideries of the Sideries (Control Sideries of the Sideries Sideries (Control Sideries Sid

Specime County Them: Asserting 1992, Stolegical and water quality rotationing in the Sussian Surve excess; 1997 - Second annual report Prepared by Sherint Smith Concessing Earlywes, CA, 199 pp. [Titler Comp. Name Assets 1989 Religions and name could be assessed in the State State

Instrume Courte Time Against (ICTA) 2001. Bully park and wave quality monetoing in the Research Every 2001. Fifth annual region Proposed for Research Long View Against Vol View (Against Vol View Against Vol View Against Vol View (Against Vol View Against Vol View (Against Vol View Against Vol View Against Vol View (Against Vol View (Against Vol View Against Vol View (Against Vol View (Agains Institute Court Wave Agency (CVA) 2000, Basins from British Assertate Joseph Agency Fred counting masses at Curyon Valley and Warm Spring Dana Proposed for CS. Assey Copy of Engineers, San Francisco Colorina (CVA) by ENTEX, for an Engineer for CS. Assey Copy of Engineers, San Francis

Institute Copy Tax Assert NTA (201), Institute Copy Tax Assert (NTA) Ministrative day Water and State and State part State asserting program. Two I would Requestly LD Copy II Service Distriction and I was to SYPA Sens Ann. CA. 2019; 2019(27) for the SYPA 2019.

Scotter State Asset: NY A. 200. Then export SHE-2000 Taxone State Taxon unreliesed and once unknown encourage program plots made; To come and Scottering to SVPA. Seem Sons, CA. 55. pp. 3-860; See and Ton C. and C. Manner, 2005.

Towns Court Than Assert 100, Securities Surgery Asserts - Description September Proposed by Securities for the US Assert Copy of Engages, for Process Disserted
Time April Time Copy Copy (CDS) Institute Decourage of Assert (NEWA) Distinct Classes There Asserts (NEWA) Marrier rather than White your first assempling programs. Then I results Properties (I Decourage of Decourage of Decourage of Decourage of Decour

in Courty Water Agency (ICWA), 2001 Marches Rown Action Plan, Out whitee SCWA, Sacra Rosa, CA, 201 pp. [12:2505]

has Tanc Samuras Conv. Comm. (VESC). 251, Samin Few Propert Applicates 1951 and persons persons 1947.4. 1949, 1950, and 1959 loads on applicates 19514. 1775, and 1951 of Samura Conv. Ware Applicates 1951 and persons and Samura Conv. Ware Applicates 1952 and 1952 a has View Journal Control (USCS) (WCS) (WCS) (WCS) (WCS) (WCS) (WCS) (We wanted - Proposed Account to the Control Wise Right or pening wave opting plants on the Businel Service (USCS) (Proposed Wise Right to pening wave opting plants in the Businel Right (WSCS) (Proposed Wise Right to pening wave opting plants in the Businel Right (WSCS) (Proposed Wise Right to pening wave opting plants in the Businel Right (WSCS) (Proposed Wise Right to pening wave opting plants in the Businel Right (WSCS) (Proposed Wise Right to pening wave opting plants in the Businel Right (WSCS) (Proposed Wise Right to pening wave opting plants in the Businel Right (WSCS) (Proposed Wise Right to pening wave opting plants in the Businel Right (WSCS) (Proposed Wise Right to pening wave opting plants in the Businel Right (WSCS) (Proposed Wise Right to pening wave opting plants in the Businel Right (WSCS) (Proposed Wise Right to pening wave opting plants in the Businel Right (WSCS) (Proposed Wise Right) (Prop

U.S. Acres Compatibilities and Charles (1997). Moreover Infoliosia assess investigations flavour flow basic unity. U.S.C.E. San Francisco, CA. 201 pp. (5.2350). VI. No and Visible Levins (1974). 1881. Leave of Frag. VI. Army Days of Engineer (1964). In Process Darms II Nov. 1884, regarding programmes from conclusion for VIACE 44 persons program the engineer for the interpret plus spaces on the face from Enter Frag. Column 1994 market (1974) decreases written by 2.1. Ration Learnmann, CA. Stran. (AAMASSA 1978).

Warment Assessed Street Street

Ecol. C.N. E. Reson, D. Nerbus, and A.N. Newborne. 1999. Modeling compared expension in Deliform's corts case: Developing content models and evaluating consequences for the surrounding on conductal including. In Newborn America 1991, Uniform Proceedings in Degr. Co. (1990a) College Space Was Could Specify Count Space (CASCAS, 200). When Quality Count Fac for the New Count Space Staff report adopted by the New Count Space Wase Quality Count State to be 20, 2000. See See See Staff Space S

Continued Facing Warn Continue Control From Liberta Printer (FIP) 2000, FIP Terminal Region Regional Contribution Associates Number April 2000, Forest Company Access, CA. 12 pp. (340 m)

Transport () 1995 Sel New manuscript proper Find manuscript bland to been Time Quality Control East, for 2007 Control ACC (100 Control Control Eastern Control Matter T. J. C. V. Balton, and S. S. San. 1897. Combined of contraction of Colleges submitted to Colleges Schools Department of National Series, contract in POTIC 13 for any White Service, Colleges (Colleges) Acres CA. 15 (2020).

Hatemann D. M. Barn, K. Burlin, C. A. Deen, W. Erman, D. Gens, P. Lin, B. Mores, and J. Warren, 2005. Decreasing fundamental actions (Contributions up.) in Northern California Front Impact for Source Source Print Agency, Medical Laboratory, Contribution of Learn Source Sourc Names P. T. & School, and D. Beller. (1995). Forms in Shortner California investments on the restriction. Electrical Extension Falseline Society. Access CA. 23 pp. [2780].**

House, () and Draft Evaluation of astronoid suppose resources on continuous conditional assessing conducted things (197) and (197). California Department of Fair and Games 17 pg (1970). Econ. 5.100. Those indices of yell-wate finishedom fini Enter V.H. M. Top and S. Harte 2001. Deliverine and address from a size Moreon California resonant transport manager from part of (MCC) under Wasseld Management (Management County). New York (MCC) 127-58 (Spr.) (Spr.)

Larin T 1999 Regional several temperature monitoring protects Florer Science Project Mandodd State Coloresty: AccounCA 19 pp. (2008)**

Letter, T. F. D. W. Languag, C. E. McChen, A. S. Viller, J. E. Kolen, and W. D. Couper, 1990. Execute Summary Supposed Assessment of Inners Temperatures Across States and Time Relationships and Time Supposed Assessment of Inners Temperatures Across States and Time Relationships and Time Supposed Assessment of Inners Supposed Assessmen

Species 17.200, Anaborous for believe Centrum's Determinent Conservations Universe of operat register, conserving months drop newsy dates, and mentions and an Disserving University of Centrum, Organism of Centrum Life Centrum Conservations (Centrum Life Centrum Conservation) and Centrum Conservation (Centrum Conserva

hillmann Scarces, 2071. A letter of code address life bistory to assets presently letting forces and the implications of biscord removal of larger woody delice in costal Mandesine Costay, and Programs for Engineering Design, Co. 17 on 17 Cont. The act of Land 1 Line 1995, Makes Complete of the Southern Towns Subsection. Experiments recognic Condens Experimentation in Noticement Collinea. Journal of Respectings, Vol. 10, No. 3 pt 101-104. Print 1974 (c).

Annua D. T. A. J. Long and D. E. Sening. 1987. From the Velor-Appel From Chair Seying counce Surray. Account CA. U.S. Francis Service Research. 22 pp. (1920) 44 Egipter 16.7 - Common C. T. Strotter, and J. Spotial 2005. And Sectionary promise for an imment and reflects ones Persistent Section conservements, and for Section 2005. PAGE 1990. C. S. Sectionaries Formation Agency Cities of Plans Paragraph Co. 1994 (1994).

Service K. 200. Physical and chemical condition in consumous (Occompanies search general station Presument Comp. Northern California Marine Treas Running Sea Company Areas, T.A. Digo visious and Philipper Sea California Sea Company Areas, T.A. Digo visious and Philipper Sea California Sea C Service X and 3 Softwa 1994, Description to determine permentality, Study-ed oxygen, and vector parties are distributed in administrating growth, As PRIX Connect #12: US Forms Enrich Region 2: Evelus CA.

200 (2-40)(2)**

Bestinov, E. W. Seitzer, F. E. Weitzer, K. N. S. Morre, R. M. Hagter, D. Moller, J. Montey, D. L. Bosser, W. E. Wasser, and E. L. Bessin. 1967. Resident for printing convey of name patrices. Discharge 30, 49 pp. 3,1750/44.

Sect. 5.1.7.2 Territory and 5.1.5 read 1991, better referred from Washington, Compared California NCAA Territoria Manuscation SOUT-SOUTEC-OF National Nation Federal Section NCAA Territoria Manuscation SOUT-SOUTEC-OF National Nation Federal Section NCAA Territoria Manuscation SOUT-SOUTEC-OF National National

College Department for an Dame (CPD) 1981, (Europe from California For and Widdle Pier Votors III Supposing Data For E Demony Spinos (Institute and Nation Sections). Supposing Data For E Demony Spinos (Institute and Nation Sections). Supposing Data For E Demony Spinos (Institute and Nation Sections). is Department of Pub and Dance (CDP). [391] California astronomic resembation recovering manual. Third addison. (CDP), Intend Roseous Division Secretarios. CA. 461 pp. (1982A).

Column Description of Early 1979, 1985 Column stem becomes provided formed by the belogged and physical below assuments in admitted access CDO Appell Superconnect To Politics Control Laboratory Section Control

Column Region Time Coult Control Econ (EVOCE 201) INC Clear Water An Service (EVOCE Inc.) was quality limited segment. (EVOCE Inc. Service Segment Segment Inc.) Tables Enter The Team Institute (TVTCE 100) Teams and percels stand enter a far Fernand English DEED, Separate 2001 Fernand project report Proposity 2 Senand CRINCE Law Fernand By Segan Set Research A. Time (DAS)

Colombia: C. J. S. E. Blook, F. A. Book, T. V. Booked, B. B. France, W. J. Lauber, and J. E. Want [49]. Response of previous toda substant and conclusion by previous of larger wordy debts in a count Westington stress. Note A servine Prints of Prints and Supplement (19): 97-95. [2002]. Commun. 7.1.1. Ill. Bal. and 7.1 bit. 2011. Decision of the original real meteor of logical post sediment or salmost populations in the Commune Even, Selfmont County: Washington Evenement in the conference balance Assertation Security Security County 6.1.100. Seath, Vol. 2016. (Sect. Vol. 2016.)

Com R. N. and T. O. Note: 1811, Commission ethics being connected as A systemic connecting decimal Environmental Spragment Volume 1. No. 2, pp. 197-199, [2850] Commun. A. Land 2. Th Kales. 1901. The officers of corporal sederate on the aquate the officers to Sequence Conference Co

Em. 31.5. and 0.7. Color, 1999. Klassati New Stateing Propert Propert Mrd RF OL Assessment of Alternative Cycle Color) in the Klassati New Selection Color Date. University Date: Color for Environment and Water Especial Exposures Select Sci. 2014 of 12 1 201 Territor, T. S., S. See in Assa, T. Strack S. Co., and N. Son, 1981. A variance study of the station cape and by state, USASTAS, as because banks of Northern Tableson. Software Tanganess, Tanasata & Reviews Santons, Section, CA, 1989, [1,1986].

Down T. J. Asse 1. Sections W. Devick D. Core. 3: Even. V. Rest., or S. Reference. 2001. A sciencial based in the prediction of consistent valuable effects. The Disneys of California Committee or Committee Valuable Effect. Committee or Com

owner of Fair and Carre (CPG) 1971, Thomps Cont. East Fair States Errer without y) are an acrey, then 1971. Depitioned CDFG file memory I Lee. Tournite, CA. Ego. (1998)**

Californi Tearment (Fas and Sente 1270), 1910 Norwall & Delive regarding block Tear Comp. Storage Storage Company on 1910 Proportion (CEV) Community & Com Transfer Company on 1910 Proportion (CEV) Community & Com Transfer Company on 1910 Proportion (CEV) Community & Com Transfer Company on 1910 Proportion (CEV) Community & Com Transfer Company on 1910 Proportion (CEV) Community & Com Transfer Company on 1910 Proportion (CEV) Community & Com Transfer Company on 1910 Proportion (CEV) Community & Com Transfer Company on 1910 Proportion (CEV) Community & Com Transfer Company on 1910 Proportion (CEV) Community & Com Transfer Community & Community

man of Februari Carra (CDPG). (MC). Nierco in Window B. Anderson regarding Colorina Creek alliation investigation, denied 29 September 1982. Chysiologic CDPG manner by M.W., long. Travel Cla., C.A.

Collings Description on Character (CED). 1811. Name in Window T. Kannisk in Franc Creds, Special Description and public condext. App. 1, 1815. Depublished CEPS in memory by Cost. Vysoroline Cal. Spe. (1940).

bein December of Fall and Same (CRO). 100 See Fee Deep Goods from volumes exemplating 10 New 1991 Coopsigned CRFs in each Sections CA Fee Differen Column Experience of the and Sarra (CEC), 1992 Letter in B. Torrowed, Claim East and Sair Club, sufficiently exception of confined product; It States 1992 Unpublished CECS concernments; K. Alaest. Natural No. 1 of 1997

Challenge - Web of Data and Papers

- Data archiving is just the beginning
- Data Publications about the data
- Capture the contributor information, fairuse criteria, and acknowledgments
- Connect to papers that used the data to the data
- Capture analysis artifacts and connect them in
- Capture data corrections/gap-fills/quality assessment
- Capture data versions and link them
- Further increase data sharing

Global Convergence in the Temperature Sensitivity of Respiration at Ecosystem Level

Miguel D. Mahecha^{1,2*}, Markus Reichstein¹, Nuno Carvalhais Gitta Lasslop1, Holger Lange4, Sonia I, Seneviratne essandro Cescatti8, Ivan A. Janssens9, Mirco Migliavacca Leonardo Montagnani11,12, Andrew D. Richardson1 dax Planck Institute for Rionsochemistry, 07745 Jona, German Universitätsstrasse 16, 8092 Zurich, Switzerland ildade de Ciências e Tecnologia, FCT, Universidade Nova de Lisbo iorsk Institutt for skog og landskap, N-1431 Ås, Norway partment of Environmental Science, Policy and Manageme ersity of California, Berkeley, CA 94720, USA RT. Federal Research Station, Reckenholzstr. 191, CH-8046 Zurich, Swit r Centre for Climate Change, McMaster University, Hamilton, Ontario, Canada ⁸European Commission, Joint Research Center Institute for Environment and Sustainability, Ispex, Ital t of Biology, University of Antwerpen, Universiteitsplein 1, 2610 Wilrijk, Belgiu Remote Sensing of Environmental Dynamics Laboratory, DISA' University of Milano-Bicocca, Milano, Italy tali. Agenzia per l'Ambiente. Provincia Autonoma di Bolzano. Bolzano. I alty of Sciences and Technologies, Free University of Bozen-Bolzan Department of Organismic and Evolutionary Biolog rard University, HUH, 22 Divinity Avenue, Cambridge, MA 02138, US.

Paper: Terrestrial Gross Carbon Dioxide Uptake: Global Distribution and Co-variation with Climate

thors: Christian Beer, Markus Reichstein, Enrico Tomelleri, Philippe Clais, Martin Jung, Nuno Carvalhais, Christian Råodenbeck, M. Altaf Arain, Dennis Baldocchi, Gordon B. Bona berte Bondeau, Alessandro Cescetti, Gitta Lasslop, Anders Lindroth, Mark Lomes, Sebastiaan Luysseert, Hank Margolis, Keith W. Oleson, Olivier Roupsard, Elmar Veenendaal, colas Viory, Christopher Williams, F. Jan Woodward, Dario Papale

Click here to see the abstract (from Science on-line)

Look below to see the sites contributing to the study (it might be necessary to install Silverlight

Contact

Another Contact

Another Contact

Contact

Another Contact

Contact

Another Contact

Responsible for Data Storage and Web Portal
Dab Agarwal, Catherina van Ingan, Marty Humpfrey, Norm Scakwilder

Responsible for Date Processing

O. Papale, M. Reichstein, Catherina van Ingen, Deb Agarwal, Tom Boden

Dennis Baldesski, Jieuan Otien, Bey Law, Hank Margelis, Danie Papale, Markus Reielistein and Calse von Rand

FLUXNET Synthesis Hembe

Acknowledgement

In order and different data amount by the AUMS amount of the author to the following above to the AUMS amount of the author of the AUMS amount of the author of the AUMS amount of the A

Acknowledgements

Berkeley Water Center, University of California, Berkeley, Lawrence Berkeley Laboratory

- Dennis Baldocchi
- Jim Hunt
- Monte Goode
- Susan Hubbard
- Keith Jackson
- Rebecca Leonardson (student)
- Carolyn Remick

Microsoft Research

- Catharine van Ingen
- Tony Hey
- Dan Fay

University of Virginia

- Marty Humphrey
- Norm Beekwilder
- Jie Li (student)

University of Indiana

You-Wei Cheah (student)

Fluxnet Collaboration

- Dennis Baldocchi
- Youngryel Ryu (postdoc)
- Dario Papale (CarboEurope)
- Markus Reichstein (CarboEurope)
- Alan Barr (Fluxnet-Canada)
- Bob Cook
- Dorothea Frank
- Susan Holladay
- Hank Margolis (Fluxnet-Canada)
- Rodrigo Vargas (postdoc)

Ameriflux Collaboration

- Beverly Law
- Tom Boden
- Mattias Falk
- Tara Hudiburg (student)
- Hongyan Luo (postdoc)
- Gretchen Miller (student)
- Lucie Ploude (student)
- Andrew Richardson
- Andrea Scheutz (student)
- Christophe Thomas

National Marine Fisheries

- Charlotte Ambrose
- Maura Moodie
- Charleen Gavette
- William Winner

Sonoma Ecology Center

- Alex Young
- Lisa Micheli
- Deanne DiPietro



Faculty Summit2010