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**2003 ANNUAL REPORT**  
**USGS Biological Resources Division**  
**Utah Cooperative Fish and Wildlife Research Unit**  
**College of Natural Resources**  
**Utah State University, Logan UT 84322-5290**

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**2004 Coordinating Meeting**  
**College of Natural Resources**  
**Utah State University**  
**14 April 2004**



Utah Department of  
Natural Resources  
Division of Wildlife  
Resources

**Utah State**  
**UNIVERSITY**



**Cooperators:**  
**USGS Biological Resources**  
**Utah Division of Wildlife Resources**  
**CNR Utah State University**  
**Wildlife Management Institute**  
**U. S. Fish & Wildlife Service**

**2004**  
**Annual Coordinating Committee Meeting**  
**Utah Cooperative Fish and Wildlife Research Unit**  
**College of Natural Resources**  
**Dean's Conference Room, NR 108**  
**Utah State University, Logan, UT**

*Rotating Chair: 1992:USU, 1993:NBS, 1994:UDWR, 1995:WMI, 1996:USU, 1997:USGS, 1998:UDWR, 1999:WMI, 2000:USU, 2001:USGS, 2002:UDWR, 2003:WMI, 2004:USU*

**Theme: Managing Initiatives in a Tight Fiscal Climate**

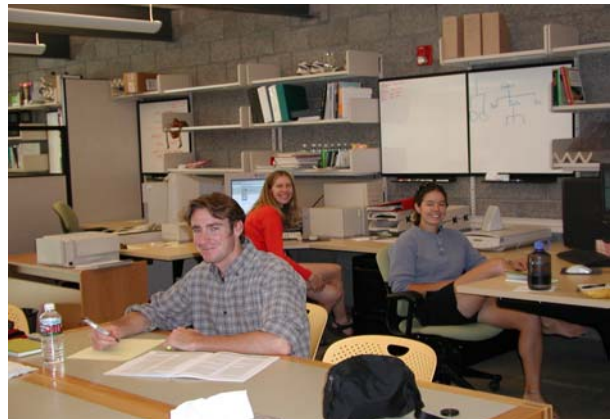
**Wednesday, 14 April 2004**

8:30-9:30	Continental Breakfast (Dean's Conference Room NR 108)
9:30-9:40	Introductions and Meeting Overview
9:40-11:00	<b>2003 Unit Productivity</b> ( <i>J. Bissonette, T. Edwards, P. Budy</i> )
11:00-11:20	<b><u>U. S. Geological Survey</u></b> <i>Lynn Haines</i> --Update on the Cooperative Research Units Program
11:20-11:40	<i>Carol Schuler</i> , Center Director, Forest and Rangeland Ecosys. Studies Ctr.
11:40-12:00	<b><u>U.S. Fish and Wildlife Service</u></b> <i>Terry Sexson</i> -- update of USFWS activities
12:00-1:00	Catered Lunch in the Dean's Conference Room NE 108
1:00-2:30	<b><u>Utah Division of Wildlife Resources</u></b> <i>Director Kevin Conway &amp; UDWR personnel</i> -- Update on UDWR Habitat Restoration and Education Initiatives
2:30-3:00	Stretch and Break
3:00-4:00	<b><u>College of Natural Resources</u></b> -- <i>Dean Fee Busby, Department Heads: Dave Roberts, Chris Luecke, Terry Sharik</i> – CNR activities and initiatives
4:00-5:00	Final Discussion, presentations, and Departure

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**003 ANNUAL REPORT**  
**USGS Biological Resources Division**  
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**2003 Research Activities of the Unit Staff**

**John A. Bissonette**  
**Thomas C. Edwards**  
**Phaedra E. Budy**

## Personnel

### Cooperators – Coordinating Committee

#### United States Geological Survey

Lynn Haines,  
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U.S.D.I. Cooperative Research Units  
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#### Utah Division of Wildlife Resources

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#### Utah State University

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### Utah Cooperative Fish and Wildlife Unit Staff

John A. Bissonette

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Shauna Leavitt

Staff Assistant

Utah Cooperative Fish and Wildlife Research Unit

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**Mission Statement  
Utah Cooperative Fish and Wildlife Research Unit  
2004**

The major limiting influences upon fishery and wildlife resources in the Intermountain West are terrestrial habitat degradation and loss and watershed and water issues. Loss of winter range for big game, degradation and loss of riparian areas by agricultural practices, loss of wildlife rangeland habitat by practices such as sagebrush removal and the planting of cattle forage, as well as change of reservoir and riverine habitat through activities associated with hydroelectric and water delivery systems are the major factors that have and will continue to affect natural resource management in Utah in years to come. Rapid population growth in the state has exacerbated the pressures on both the terrestrial and aquatic resource. Given these trends and the expertise of Unit personnel, the primary mission of the Unit is to address food web and habitat related problems relating to the fishery and wildlife resources of Utah and the Intermountain West.

Cooperating Faculty in the Department, College, and University are, and will continue to be, integrated into Unit research to apply diverse expertise to all facets of a research problem. In addition to the more traditional fields of biological endeavor, expertise in geographical information systems, expert systems, artificial intelligence, sociological science, survey methodology, chemical and contaminant analysis, and computer modeling and methodology, as well as other pertinent fields, can be brought to bear on resource problems. The primary motivation of the Unit is to solve pressing resource problems.

Technical expertise of the Unit staff includes: larger scale dynamics, geographical information system and habitat restoration methodology, terrestrial habitat analysis, population management and assessment, aquatic habitat ecology, fish population dynamics, aquatic food web dynamics, and quantitative study design. Our research activities focus on landscape-level habitat studies, ecological modeling of lake, reservoir, and riverine systems, and avian and terrestrial ecology. Future research directions of the Unit will continue to involve endangered fish and wildlife species, sustainable game and sport fish management, terrestrial and aquatic riparian studies, migratory non-game bird research, and geographical information system methodology, and landscape-level studies involving modeling for future scenarios.

Graduate level courses being taught by unit personnel at Utah State University include Design and Analysis of Ecological Research (emphasizes the research process), Topics in Spatial Ecology (emphasizes space from an ecological as well as statistical perspective), and Assessment of Fish and Wildlife Populations (emphasizes sampling design and estimation of abundance and survival). Unit personnel are increasingly involved in continuing education/professional advancement short courses for agency personnel.

The Unit is committed to academic pursuit of cooperator interests, and in particular, the needs of the Utah Division of Wildlife Resources. Yet, the strength of the Unit is directly related to its ability to attract outside funds. Research done in the state and region with non-cooperator funds provides added benefits to cooperators. This Unit has and will continue to address resource issues associated with its expertise to the benefit of Utah and the resource management community. Our primary objective is quality science.



## UTAH COOPERATIVE FISH AND WILDLIFE RESEARCH UNIT

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UTCFRU

# 2004 SUMMARY OF FISCAL EXPENDITURES ON RESEARCH PROJECTS AND THE UNIT BASE ACCOUNT

# UTAH COOPERATIVE FISH AND WILDLIFE RESEARCH UNIT FUNDING SUMMARY BY SOURCE JANUARY – DECEMBER 2003

UTCWFRU

Updated: 04/08/04

## 1. Cooperator Base Funds:

### a. U. S. Geological Survey - Cooperative Research Units

Federal Salaries & Benefits

313,596

Operating

15,375

Subtotal

328,971

### b. Utah Division of Wildlife Resources Base

Base Account

46,000

10% Direct Administrative Costs paid on UDWR Project

48,289

Subtotal

94,289

10% UDWR

### c. Utah State University Contribution

Staff Support Salary & Benefits

32,032

Space

25,069

Indirect Costs Waived on CY 2003 Projects

296,487

Subtotal

353,588

ALL OTHERS

## 2. Indirect Costs Paid on CY 2003 Projects

74,227

~ 20%

## 3. Total CY 2003 Project Funding Invoiced (Includes IDC Paid + 10% UDWR)

993,295

TOTAL CONTRACTS

## 4. TOTAL CY 2003 Funding Received

1,844,370

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Agency  
Contributions

# UTAH COOPERATIVE FISH AND WILDLIFE RESEARCH UNIT

## SUMMARY OF FUNDING

### JANUARY – DECEMBER 2003

UTCWFRU

#### Utah Division of Wildlife Resources

Fishery Research

193,630

Other

337,544

#### Federal

RWO

404,192

Other

57,929

**\$531,154 = ~ 53.5%** ↗

**\$462,121 = ~ 46.5%** ↗

# GRAND TOTAL = \$993,295

# UTAH COOPERATIVE FISH AND WILDLIFE RESEARCH UNIT

## UDWR **OPERATING** BASE

### JANUARY – DECEMBER 2003

UTCFWRU

Personnel	\$5,739
Fringe	\$1,965
Travel	\$10,997
Commuting	\$860
Mail	\$440
Telecommunications	\$2,952
Supplies	\$7,871
Office Equipment	
Maintenance	\$1,362
Non-Capital	
Equipment	\$0
Rentals	\$0
Insurance	\$418
Equipment	\$12,582
Repairs	\$0
Vehicles	\$0
Maintenance	\$5,142
Professional	
Development	\$1,917
Guests	\$1,262
Tuition	\$1,022
Miscellaneous	\$131

**Total**

**54,658.93**

**~ 1,500 LEFT  
TO FY 05**

**CALENDAR YEAR**

# UTAH COOPERATIVE FISH AND WILDLIFE RESEARCH UNIT

## ACTIVE RESEARCH – UNIT SCIENTISTS

### JANUARY – DECEMBER 2003

UTCFWRU

Project Duration	Account Number	Project Title and Funding Source(s)	Principal Investigator(s)	Funding Project Total	CY 2003 Funding
2001-2003	5-33076	Avian Composition in Deciduous Riparian Forests of Southeastern Alaska, (USGS RWO 35)	Bissonette, J	61,973	-
2001-2003	5-33254	The Influence of Biophysical Gradients in Sagebrush Steppe Communities and Their Influences on Selected Wildlife Taxa, (USGS RWO 48)	Bissonette, J	145,538	51,612
		Utah Vegetation Exclosures Database Study, Phase 1 JSA001099 T.O 15			
1998-2004	5-33331	BLM Contribution	Bissonette, J	16,003	-
2002-2004	Multiple	FS & DWR Contribution	Bissonette, J	46,000	42,745
2000-2003	5-33313	LEMA Contribution	Bissonette, J	8,000	-
2003-2004	5-33540	NEW Funding	Bissonette, J	10,000	-
2004-2007	NEW	Evaluation of the use and Effectiveness of Wildlife Crossings (NEW)	Bissonette, J	500,000	new
2004-2006	5-43049	Evaluation of Wildlife Crossings -Dept of Trans/BLM (NEW)	Bissonette, J	64,170	new
2002-2003	5-43493	Sports Fishery Research: Logan River Trout	Budy, P	162,270	46,746
2002-2003	5-43500	Sports Fishery Research: Rainbow Trout, Flaming Gorge	Budy, P	100,810	5,698
2002-2003	5-43615	Lake Powell Food Webs	Budy, P	123,481	64,928
2002 - 2004	5-33355	Bull Trout Assembly/Life-History Characteristics: Habitat Quality/Land Use: Walla Walla Sub-Basin Recovery Planning (RWO 49)	Budy, P	235,713	140,457
2003-2004	5-33516	Snake River Salmon Modeling (continuation of RWO#40)	Budy, P	69,321	9,974
2000-2004	5-33103	Population-Level Response of Terrestrial Amphibians to Disturbance: Effect of Fire and Fuels Treatment (USGS BRD FRESC RWO 37)	Edwards, T	152,778	5,517
2000-2003	5-36984	Design & Analysis Protocols for Sampling Rare Ecological Events in Time & Space	Edwards, T Cutler, R		
		USGS Biological Resources Division (BRD) RWO 41		142,000	38,091
		USDA Forest Service			
		Oregon State Office, Bureau of Land Management			
2000-2003	5-33252	Alternative Futures for Utah's Wasatch Front: Bioregional Planning for the Maintenance and Conservation of Open Space	Edwards, T		
		USGS BRD RWO 46		50,000	4,346
1999-2003	5-33015	Modeling Spatially Explicit Forest Structural Attributes Using Generalized Additive Mixed Models (USFS)	Edwards, T	270,000	30,391

≈ 44.35%

2,158,057

440,505

# UTAH COOPERATIVE FISH AND WILDLIFE RESEARCH UNIT

## ACTIVE RESEARCH – OTHER PRINCIPLE INVESTIGATORS

### JANUARY – DECEMBER 2003

UTCFWRU

Project Duration	Account Number	Project Title and Funding Source(s)	Principal Investigator(s)	Funding Project Total	CY 2003 Funding
1996-2003	5-43544	Brine Shrimp of the Great Salt Lake (UDWR)	Belovsky, G	511,476	51,970
2002-2003	5-43437	Freshwater Mussel Survey (UDWR)	Brim-Box, J	52,844	239
2002-2003	5-33357	DNA Genetic Analysis (USGS RWO 50)	Dueser, R	15,000	12,746
2001-2003	5-33172	Kit Fox – Coyote Habitat-Diet Competition and Behavioral Interaction (USGS RWOs 32 & 43, DoD Army, Dugway)	Gese, E	18,306	153
1996-2005	5-33255	Swift Fox as an Indicator Species of Ecosystem Health on the Pinon Canyon Maneuver Site (USGS RWOs 25 & 47, USFWS)	Gese, E	173,300	51,555
2003-2003	5-43626	Design & Testing Survey of Fishing License Sales Campaign	Jakus, P	10,000	3,252
2001-2003	5-43453	Sports Fishery Research: Population Dynamics	Luecke, C	13,930	599
2002-2003	5-33297	Sport Fishery Research: Walley Population Dynamics in Mid-elevation Reservoirs (UDWR)	Luecke, C	6,000	968
1999-2003	5-33296	Sport Fishery Research: Willard Bay Food Habits and Plankton Analysis	Luecke, C	25,092	784
1996-2003	5-33286	Sport Fishery Research: Bear Lake Endemic Fishes (UDWR)	Luecke, C	129,689	73,906
2001-2004	5-43455	Monitoring Gunnison Sage Grouse Populations and Their Habitat Use Patterns in San Juan County (UDWR)	Messmer, T	29,000	17,956
2002-2003	5-43508	Utah Prairie Dog Habitat Conservation Plan	Messmer, T	40,722	4,184
2002-2004	5-43593	Evaluating the Effects of Emergency Winter Feeding on Mule Deer Survival, Production and Habitat Conditions	Messmer, T	86,020	43,220
2002	5-43552	Aggregate Economics Impacts of CWMU on Member Landowners and Local Communities	Messmer, T	7,500	158
1999-2004	5-43228	Sage Grouse Movements, Mortality, and Habitat Use in South Central Utah	Messmer, T	35,000	3,075
2000-2002	5-43363	Monitoring Songbirds on Utah's Private Lands	Messmer, T	4,500	186
2001-2003	5-43414	Implementaton of a Community-Based Conservation Extension Specialist to Facilitate Sage Grouse Conservation Efforts (UDWR)	Messmer, T	32,000	14,864
2003-2006	5-43678	Columbian Sharptailed Grouse	Messmer, T	107,800	37,413
2003	5-43009	Enhancing Sage-Grouse Programs	Messmer, T	203,181	1,180
2001-2003	5-43436	Characterization of Utah Suckers (UDWR)	Mock, K	44,568	-
2002-2004	5-43600	Provide a Genetic Analysis of June Sucker	Mock, K	33,350	9,701
2001-2003	5-43009	Least Chub	Mock, K	20,602	15,612
2003-2005	5-33494	Southwest Gap Anaysis (USGS RWO 51)	Ramsey, D	155,268	24,583
2003	5-33417	Parashant National Monument	Shultz, L	9,720	7,233
2003-2004	5-33423	Accuracy for Vascular Plant Data	Shultz, L	20,907	20,305
1999-2004	5-33028	Global Climate Effects on Nitrogen and Carbon Biogeochemistry in GSMNP (USGS RWO 34, MESC)	VanMiegroet, H	221,883	75,132
2002-2004	5-43576	The Occurrence and Distribution of New Zealand Mud Snail in UT	Vinson, M	25,000	2,178
2000-2003	5-44603	Mammals Program Coordinator (UDWR)	Wolfe, M	153,972	110
1995-2003	5-43566	The Accuracy and Utility of Using Population Estimators to Manage Cougar Populations in Utah	Wolfe, M	620,060	79,527
				<b>2,806,690</b>	<b>552,789</b>

≈ 55.65%

# Unit Productivity

## USGS Utah Cooperative Fish and Wildlife Research Unit Productivity

*1 January 2003 to 31 December 2003*

### PUBLICATIONS

#### A. SCIENTIFIC PAPERS

[Bissonette](#), J. and I. Storch. 2003. Understanding Fragmentation: Getting Closer to 42. *Conservation Ecology* 7(2): r5. [online] URL: <http://www.consecol.org/vol7/iss2/resp5>

[Bissonette](#), J. A., T. Clevenger, and L. Fahrig (no precedence of authorship). 2003. Chapters 5&6, pages 113-167 in Forman, R. T.T., D. Sperling, M. Binford, J. Bissonette, T. Clevenger, C. Cutshall, V. Dale, L. Fahrig, C. Goldman, K. Heanue, J. Jones, F. Swanson, T. Turrentine, & T. Winter. *Road Ecology: Science and Solutions*. Island Press, Covelo CA.

Hellgren, E. C., and J. A. [Bissonette](#). 2003. Collared peccary. Chapter 41 (pages 867-876) in G. A. Feldhamer and B. Thompson, eds., *Wild Mammals of North America: biology, management, and economics*. Second edition. The Johns Hopkins University Press, Baltimore, MD, USA.

Hunter, L. M., M. de J. Gonzalez, R. E. Toth, T. C. [Edwards](#), Jr., and R. J. Lilieholm. 2003. Population and development in the California Mojave Desert: natural habitat implications of alternative futures. *Population Research and Policy Review* 22:373 397.

Bassett, S. D., and T. C. [Edwards](#), Jr. 2003. Effect of different sampling schemes on the spatial placement of conservation reserves in Utah, USA. *Biological Conservation* 113:141 151.

McHugh, P., and P. [Budy](#). 2004. Patterns of spawning habitat selection and site suitability for two populations of Snake River spring chinook salmon. *Transactions of the American Fisheries Society* 133: 89-97.

#### Books

Forman, R. T.T., D. Sperling, J. A. [Bissonette](#), A. P. Clevenger, C. D. Cutshall, V. H. Dale, L. Fahrig, R. France, C. R. Goldman, K. Heanue, J. A. Jones, F. J. Swanson, T. Turrentine, & T. C. Winter. 2003. *Road Ecology; Science and Solutions*. Island Press, Covelo, CA. 481 pages.

#### In Press

McHugh, P., P. [Budy](#), and H. Schaller. *In Press*. A model-based assessment of the potential response of Snake River spring/summer chinook salmon to habitat improvements. *Transactions of the American Fisheries Society*, *Accepted September 29, 2003*.

De la Hoz Franco, E.A., and P. [Budy](#). *In Press*. Linking Environmental Heterogeneity to the Distribution and Prevalence of *Myxobolus cerebralis*: A Comparison Across Sites in a Northern, Utah Transactions of the American Fisheries Society, January, 2004, *Accepted March 11, 2004*.

Switalski, A., J. A. [Bissonette](#), T. H. Deluca, C. H. Luce, and M. A. Madej. 2004. Benefits and impacts from road removal. *Frontiers in Ecology and the Environment*. In Press (Feb. 2004)

[Bissonette](#), J. A. *In Press*. Thinking differently at larger ecological scales: developing the strategy. Proc. 12<sup>th</sup> Ann. Meeting Australasian Wildl. Manage. Soc., Darwin, Australia.

[Edwards](#), T. C., Jr., Cutler, R., L. Geiser, J. Alegria, and D. McKenzie. 2004. Assessing rarity and seral stage association of species with low detectability: lichens in western Oregon and Washington forests. In press, *Ecological Applications*.

[Edwards](#), T. C., Jr., Cutler, R., N. E. Zimmermann, L. Geiser, and J. Alegria. Use of model assisted designs for sampling rare ecological events: lichens as a case example. *Accepted contingent on revision, Ecological Applications*.

Lawler, J. J., and T. C. [Edwards](#), Jr. A variance decomposition approach to investigating multi scale habitat associations. *Accepted contingent on revision, Oecologia*.

DeNormandie, J., and T. C. [Edwards](#), Jr. The umbrella species concept and regional conservation planning in southern California: a comparative study. *Accepted contingent on revision, Conservation Biology*.

## **In Review**

De la Hoz Franco, E.A., and P. [Budy](#). *In Review*. Effects of biotic and abiotic factors on the distribution of trout and salmon along a longitudinal stream gradient. *Environmental Biology of Fishes*, Re-Submitted March 19, 2004, Originally submitted October 16, 2003.

Haddix, T. and P. [Budy](#). 2004. *In Review*. The relative influence of morphological and behaviour in prey selection by rainbow trout. Submitted to *Copeia*, March 12, 2004.

Bjurlin, C., and J. A. [Bissonette](#). *In Review*. Survival during early life stages of the desert tortoise (*Gopherus agassizii*) in the south-central Mojave Desert. Submitted to *Journal of Herpetology*.

Zakrajsek, E. J., and J. A. [Bissonette](#). *In Review*. Ranking the risk of wildlife species to military aircraft. Submitted to *Wildlife Society Bulletin*.

## **B. TECHNICAL & SEMI-TECHNICAL PAPERS**

Switalski, T. A., J. A. [Bissonette](#), T. H. DeLuca, C. H. Luce, and M. A. Madej. 2003. Wildland road removal: research needs. Pages 642-646 in 2003 Proceedings of the International

Conference on Ecology and Transportation, edited by C. Leroy Irwin, Paul Garrett, and K. P. McDermott. Raleigh, NC: Center for Transportation and the Environment, North Carolina State University, 2003.

Budy, P., G. P. Thiede, E. A. de la Hoz, and S. Vatland. 2003. Logan River whirling disease study: factors affecting trout population dynamics, abundance, and distribution in the Logan River, Utah. Project XIII, Annual Report to Utah Division of Wildlife Resources. 50 pages.

Budy, P., G. P. Thiede, and T. Haddix. 2003. Rainbow trout growth and survival in Flaming Gorge Reservoir. Project XIV, Annual Report to Utah Division of Wildlife Resources. 86 pages.

Budy, P., R. Al-Chokhachy, and G. P. Thiede. 2003. Bull trout population assessment and life-history characteristics in association with habitat quality and land use in the Walla Wall River Basin: a template for recovery planning. Annual Progress Report to US Fish and Wildlife Service. 41 pages.

Johnson, J. A., B. A. Andres, and J. A. Bissonette. 2004. Breeding bird communities of major mainland rivers in Southeast Alaska. Fish and Wildlife Service General Technical Report. In Press.

Edwards, T. C., Jr., and D. R. Cutler. 2003. Abundance and association analyses of survey and manage bryophyte data from the pilot random grid surveys. Final Project Report No. 2003-2, USGS Utah Cooperative Fish and Wildlife Research Unit, Utah State University, Logan, UT 843232-5290 USA.

Cutler, D. R., T. C. Edwards, Jr., J. Alegria, D. McKenzie, and A. Cangelosi. 2003. Abundance and association analyses for the GOBIG2K mollusk and amphibian survey. Final Project Report No. 2003-1, USGS Utah Cooperative Fish and Wildlife Research Unit, Utah State University, Logan, UT 843232-5290 USA.

## **C. PROJECTS COMPLETED: THESES AND DISSERTATIONS**

### **J. A. Bissonette**

Johnson, James. 2003. Breeding bird communities of major mainland rivers of southeastern Alaska. M.S. Thesis, 167 pages + appendices.

### **P. Budy**

De la Hoz Franco, E.A. 2003. Assessing the effects of *Myxobolus cerebralis* and other environmental factors on the dynamics, abundance, and distribution of endemic trout populations in the Logan River, Utah. MS Thesis. Utah State University, 87 pages.

Haddix, T. 2004. Factors affecting growth of rainbow trout in Flaming Gorge Reservoir, Utah-Wyoming. MS Thesis. Utah State University, 81 pages.

## **T. C. Edwards**

Schultz, R. J. 2003. Nest-site selection by cavity nesting birds: connecting patterns of habitat use among spatial scales. MS Thesis, Utah State University.

Steckel, D. A. 2003. Effects of urban encroachment on the ecological integrity of military reservations in the California Mojave Desert. MS Thesis, Utah State University.

## **D. PAPERS AND POSTERS PRESENTED (FY 2003 ONLY)**

### **Invited**

Edwards, T. C., Jr., R. E. Toth, and R. J. Lillieholm. Modeling the urban-wildland interface: open space planning along Utah's Wasatch Front. Invited paper, Utah Rural Summit 2003: Collaborative Planning in the Intermountain West, Southern Utah University, Cedar City, Utah, 7/8/03.

Edwards, T. C., Jr. Spatially explicit conservation modelling: from the ecological to the cultural landscape. Invited paper, Department of Fishery and Wildlife, Colorado State University, Ft. Collins, Colorado, 7/29/03.

Toth, R. E., R. J. Lillieholm, and T. C. Edwards, Jr. Designing the right process: Case study #2 - The Mojave Desert. Invited paper, Workshop on Regional Collaboration: Learning to Think and Act Like a Region, Lincoln Institute of Land Policy, Salt Lake City, Utah, 4/9/03.

Edwards, T. C., Jr. A process for integrating the vision of landscape ecology. Invited paper, Swiss Federal Research Institute for Water, Snow and Landscape Research, Birmensdorf, Switzerland, 1/28/03.

Al-Chokhachy, R., and P. Budy. 2003. Assessing bull trout population abundance and trends in the South Fork of the Walla Walla River, Oregon. American Fisheries Society, Quebec, CAN. 8/12/03

### **Contributed**

Switalski, A., J. A. Bissonette, T. H. Deluca, C. H. Luce, and M. A. Madej. 2003. Watershed benefits from road removal. 17<sup>th</sup> Annual Meeting of the Society for Conservation Biology, Duluth Minnesota, 6/28-7/2-03.

Switalski, A., J. A. Bissonette, T. H. Deluca, C. H. Luce, and M. A. Madej. 2003. Wildland road removal: Research needs. International Conference on Ecology and Transportation, Lake Placid, New York. 8/24-29/03.

- Bissonette, J. A. 2003. Fragmentation: spatial arrangement or habitat amount – how can we decide relative importance for wildlife species. XXVI<sup>th</sup> International Union of Game Biologists Congress, Braga, Portugal, 9/1/03.
- Bissonette, J. A. 2003. Importance of distinguishing between spatial arrangement and habitat loss in fragmentation studies of wildlife species. Tenth Annual Conference of The Wildlife Society, Burlington, Vermont, 9/8/03.
- Bissonette, J. A. 2003. Understanding fragmentation: getting to 42. Third International Wildlife Management Congress, Christchurch New Zealand, 12/3/03.
- Edwards, T. C., Jr., R. Cutler, and J. Alegria. Using FIA data to develop model-assisted designs for sampling rare ecological events. Presented paper, Joint Meeting of the 5th Annual Forest Inventory and Analysis Symposium and The Southern Mensurationists, New Orleans, Louisiana, 11/08/03.
- de la Hoz, E. A., and P. Budy. 2003. Distribution of *Myxobolus cerebralis* in salmonid populations in the Logan River, UT: Potential effects of habitat heterogeneity on differences in prevalence. 9th Annual Whirling Disease Symposium. Seattle, WA. 2/15-16/03.
- Al-Chokhachy, R., and P. Budy. 2003. Assessing bull trout population abundance and trend using a double mark/recapture/resight technique in combination with passive PIT tag antennae in the South Fork of the Walla Walla River. Invited presentation, Symposium, Oregon Chapter of the American Fisheries Society, Eugene, OR. 2/23/03.
- de la Hoz, E. A., G. P. Thiede, and P. Budy. 2003. Linking environmental factors to the distribution and prevalence of *Myxobolus cerebralis* among trout in the Logan River, UT. Bonneville Chapter of the American Fisheries Society, Grand Junction, CO. 3/5/03.
- Hadley, M. J., and P. Budy. 2003. Comparison of growth of stocked rainbow trout in Flaming Gorge Reservoir, Utah-Wyoming to potential maximum growth. Poster. Bonneville Chapter of the American Fisheries Society, Grand Junction, CO. 3/5/03.
- Budy, P., R. Al-Chokhachy, and G. Thiede. 2003. Using PIT tag data to parameterize simple and elaborate mark/recapture models: tools for conservation and recovery planning. Invited presentation, Symposium. American Fisheries Society, Quebec, CAN. 8/14/03.
- McHugh, P., Budy, P., Thiede, G., and de la Hoz, E. 2003. Evaluating the demographic effects of disease on Bonneville cutthroat trout in the Logan River, Utah: a PVA approach. American Fisheries Society, Quebec, CAN. 8/15/03.
- Thiede, G.P., P. Budy, P. McHugh, and E. A. de la Hoz. 2003. Evaluating the effects of fish movement on the spread and prevalence of disease in the Logan River, Utah, USA. American Fisheries Society, Quebec, CAN. 8/16/03.

## E. CLASSES AND SHORT COURSES

### J. A. Bissonette

FW6700/7700, Landscape Ecology: 3 credit hours, graduate class, Winter Semester, 22 students.

Landscape Ecology Workshop, 2 weeks (16-27 June 2003), University of Lisbon (Portugal), 20 M.S. and Ph.D. students.

### T. C. Edwards

FRWS 6500 Design and Analysis of Ecological Research, Fall 02, 4 credits, graduate, 38 students

### P. Budy

Population Assessment (AWER 6660), 3 units, graduate, 14 students.

Population Assessment Shortcourse. Bonneville/Wyoming/Colorado Chapters of AFS, 22 enrolled, Grand Junction, CO. 3/6/03

## F. RECOGNITION & AWARDS (2003-2004)

Al-Chokhachy, R. 2004. Department of F&W, Terri Lynn Steel Award. Awarded for academic excellence (\$290).

Vatland, S., and P. Budy. 2004. Using present and past data to model predator-prey dynamics in Lake Powell, Utah-Arizona: A bioenergetics approach. Invited Seminar for Reservoir Management Symposium. Western Chapter of American Fisheries Society. Best Student Paper Award (\$100).

Vatland, S., and P. Budy. 2004. Using present and past data to model predator-prey dynamics in Lake Powell, Utah-Arizona: A bioenergetics approach. Utah State University - Water Initiative: Spring Runoff Conference, Logan, UT. Best Student Paper Award Again (\$250).

### Fellowships:

McHugh, P. 2002-2004. Quinney PhD fellowship, \$2400.

Vatland, S. 2003-2004. Vice Presidential MS USU fellowship, \$12,000.

Homel, K. 2004-2005. Vice Presidential MS USU fellowship, \$12,000.

## **G. SPECIAL ASSIGNMENTS**

### **J. A. Bissonette**


2003 International Wildlife Management Congress, Christchurch, New Zealand  
 Chairman, Publications Committee, Member, Program Committee  
 Member, Support of Symposia and Conferences Committee,  
 Member, Site-Selection Committee  
 Chair, Admissions Committee, Forestry, Range, and Wildlife Sciences Department, USU

### **P. Budy**

USFWS June Sucker Recovery Team.  
 USFWS Bull Trout Research, Monitoring, and Evaluation Technical Team.  
 USU Department of Aquatic Watershed and Earth Resources, Graduate Academic Review Committee.  
 USU College of Natural Resources, Educational Policy Committee.  
 USU, College of Natural Resources, Graduate Fellowship Advisory Committee.





### **T. C. Edwards**

Statistical Advisory Group, USDA Forest Service  
 Survey and Management Program, Pacific Northwest Forest Management Plan



## 2003 RESEARCH ENDEAVORS

John A. Bissonette  
 USGS Biological Resources Division  
 Utah Cooperative Fish and Wildlife  
 Research Unit  
 College of Natural Resources  
 Utah State University

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## The 2004 Landscape Ecology Lab

- Bill Adair – Ph.D. Post Doc. Exclosures
- Andy Leidolf – PH.D. candidate
- Lisa Nordstrom – Ph.D. candidate
- Beth Johnson – M.S. candidate
- Tammy Wilson – M.S. candidate
- Silvia Rosa – M.S. candidate (new)
- Chris Kassar – M.S. candidate (new)

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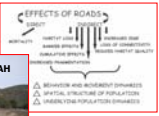



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## USE AND EVALUATION OF WILDLIFE CROSSING STRUCTURES

- New project, 3 years, begins ~June 2004 \$500,000
- Funded by National Academies of Science and Engineering (Transportation Research Board)
- Goal:
  - update 'scan report'
  - indirect effects research
  - prepare electronic decision tool designed for Departments of Transportation (U.S. & Canada)

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## Exclosures in Utah

Product: Dynamic Interagency Exclosure Database

So far from all National Forests and BLM offices in Utah:

1,014 study exclosures records

- ~65% still functional ~35% have data

~13,000 files scanned

- + ~6-7K files not scanned
- = ~20K documents reviewed

Of the ~6-7K not scanned:

- ~40% scientific documents not worth scanning (preliminary score cards, redundant)
- ~60% were record keeping

"I went out and inspected... "

BILL, the outlaw biker with friend

FUNDORS: UDWR, BLM, USFS

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## Exclosures in Utah

Study 43-42 Mosby Canyon #4 Experimental Exclosure, Vernal District, Ashley National Forest, S. Goodrich 12 August 1996

**EXCELLENT DOCUMENTATION**

\*Camera Point is NE of the exclosure and such that the NE and SW corner post of the exclosure are in line. Camera point is east of the exclosure with camera direction westerly. Both photos demonstrate slightly higher vigor of grasses inside the exclosure compared to outside. Sagebrush canopy cover is about equal inside and outside. The exclosure demonstrates the grazing system of the past few decades has maintained composition and vigor near potential. However, it does indicate vigor of graminoids is slightly decreased by ungulate grazing on the outside. Ground cover outside the exclosure seems adequate to protect the soil, but it is somewhat less than inside the exclosure.

**Example of a very old exclosure (1929) of dubious value because of its size. 1920s and 1930s exclosures were characteristically of this size**

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## Exclosures in Utah

Pine Hollow 1995 (Ashley NF Vernal)

This is an example of the inherent value of multi-part exclosures for teasing out herbivory effects. The photograph was taken looking down the fence separating the part that excludes only livestock (left side) and the part that excludes livestock, deer, and elk (right side). This exclosure was constructed in 1965 as part of an herbicide application project.

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UTC FWRU

USGS

1994

2000

The Moab District Office is the only BLM office that has consistently associated repeat studies with exclosures. These two sets of photos show the influence of inter-annual variation--1994 was a relatively lush year, and 2000 was not.

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UTC FWRU

USGS

exclosure

Note that range professionals often call these "rodent-proof" exclosures, despite the fact that mice, rats, and gophers can still get in

This is also one of the few large rabbit and livestock-proof exclosures in the state. It also has a livestock-proof partition, but there are no comparable photos for that part.

This exclosure, built in 1937, has shown very dramatic exclosure effects. Unfortunately the documentation is very poor (there are no photos prior to 1995, and no quantitative studies at all), so we have little idea of how these effects came about.

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UTC FWRU

USGS

1986

2001

These photos provide an extreme example of inter-annual variation and illustrate the importance of a systematic approach to monitoring. 1986 was a very wet year, and 2001 was a dry year. No repeat photos are available, so there are no exact matches.

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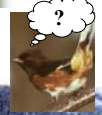


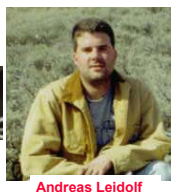
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## The Effect of Fire on Avian Communities

Andreas Leidolf

**THREE PHASED STUDY**

FUNDORS: UTAH ARMY NATIONAL GUARD, UDWR, ECOLOGY CENTER, UCFWRU,  
TEACHING ASSISTANTSHIPS: FRWS DEPT, CONTINUING ED.

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## The Effect of Fire on Avian Communities

### Objectives

- Understanding how the literature on **avian community response to fire** has advanced ecological knowledge and theory, specifically with respect to the role of disturbance in structuring biological communities.
- Point out philosophical and methodological approaches likely to further that understanding.
- Provide useful information to inform natural resource management and policy in the form of databases, bibliographies, and synthetic reviews.

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## The Effect of Fire on Avian Communities

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graph TD
    A[Phase IA  
Literature Search] --> B[Phase IB  
FIREBIRD Database]
    B --> C[Annotated Bibliography  
Phase IIA]
    B --> D[Literature Review  
Phase IIB]
    B --> E[Meta-analyses  
Phase III]
  
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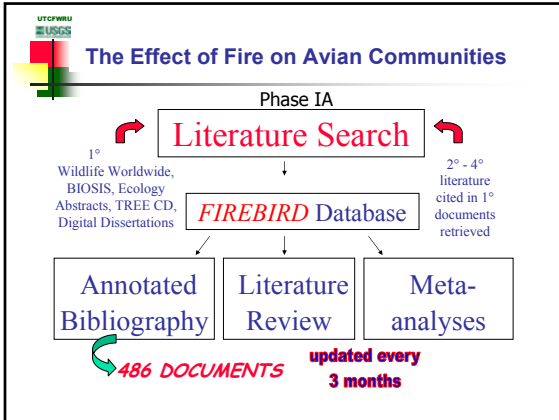
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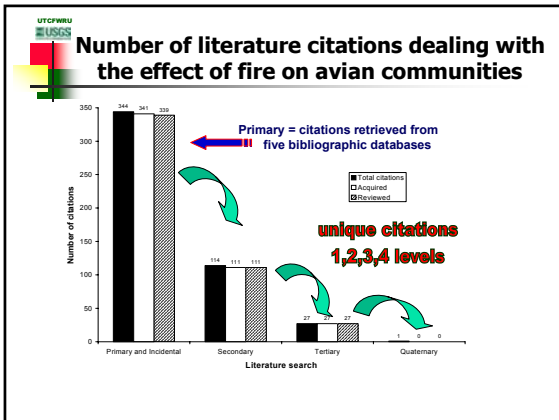
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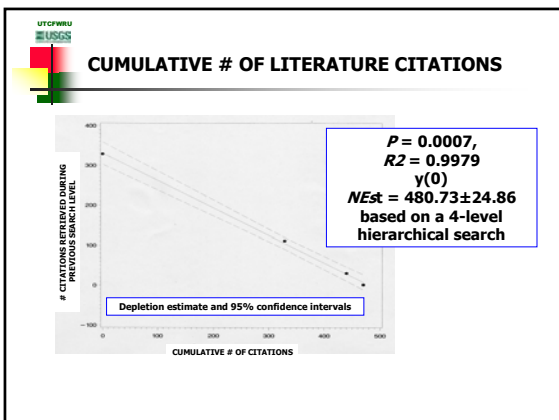
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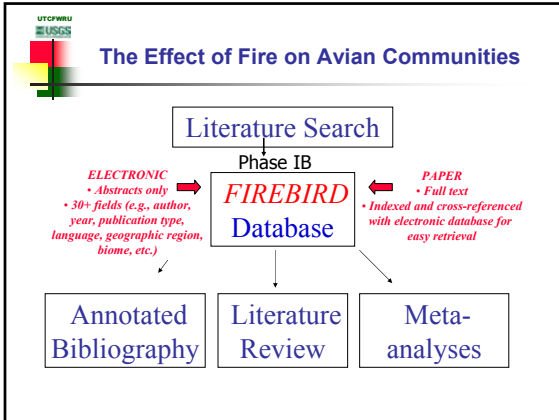
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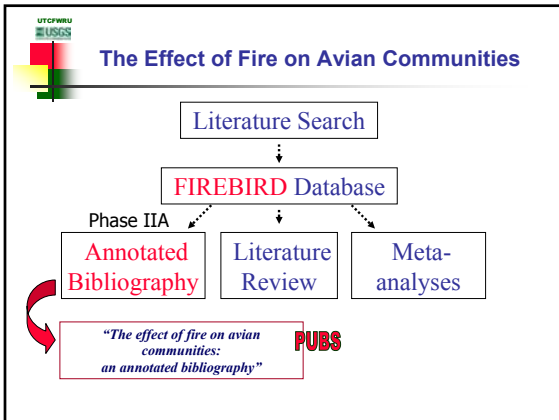
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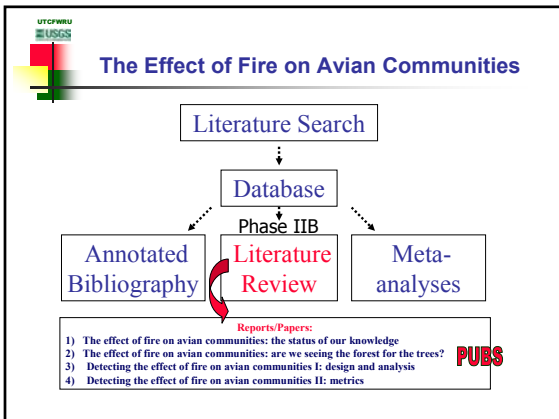
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## Effects of Enclosure Design on Rhinos and Tapirs

Zoological parks play an increasing role in conservation as ex situ conservation is more frequently required to preserve the growing number of endangered species. However, few studies have examined the effects of enclosure attributes on the health, longevity, mortality, and breeding success of captive animals.

Lisa Nordstrom

**Enclosure Attributes:**  
Size, substrate, shade, water features, public viewing area, climate, etc.

**Effect on Tapirs and Rhinos:**  
Reproduction, Mortality, Health

Malayan Tapir, Chaffee Zoological Gardens of Fresno, CA

Black Rhino, Los Angeles Zoo, CA

**FUNDORS: USU PRESIDENTIAL SCHOLARSHIP, ECOLOGY CENTER**

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## Effects of Enclosure Design on Rhinos and Tapirs

Studbook data obtained to provide data on reproduction, mortality, inter-zoo transfers.

Enclosure Attribute Survey to all U.S. zoos, questionnaires mailed to all zoos in U.S. with 95% response, + 15 international zoos participated.

RHINO EXHIBIT  
SAN FRANCISCO ZOO

TAPIR EXHIBIT  
LOS ANGELES ZOO

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## Effects of Enclosure Design on Rhinos and Tapirs

**General Prediction:**  
a combination of enclosure attributes will influence health, reproduction, and/or longevity

Rate (Births or Deaths / yr.)

Exhibit Area

reproduction

mortality

Enclosure Size

Complexity

Enclosure Design

Captive Animal

Husbandry

Public

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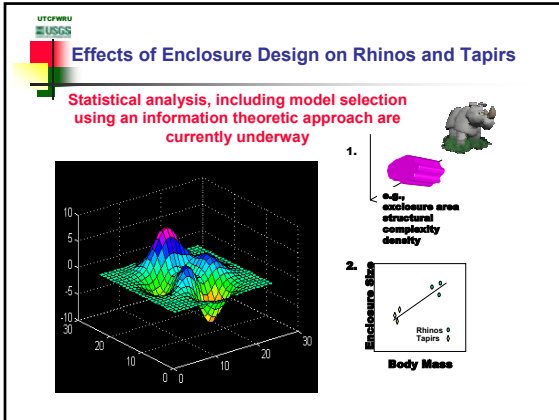
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UTC FWIU  
USGS

### Landscape dynamics of bird and small mammal communities in sagebrush-dominated mountain meadows

- **Overview**
  - Sagebrush steppe has been heavily impacted over much of its range
    - Conversion to agriculture
    - Changed fire regime
    - Heavy grazing
  - High elevation sagebrush steppe
    - More mesic conditions
    - Greater heterogeneity
    - Different history of land use

Photo: B. Margaret Pritzke

Montana Sagebrush Bibliography  
<http://www.fwp.state.mt.us/inside/fwp/library/sage.pdf>

FUNDOR: U.S. FOREST SERVICE

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UTC FWIU  
USGS

### Biodiversity in High Elevation Sagebrush Steppe

Some sagebrush obligates or near-obligate species of management concern

- Sage Sparrow
- Brewer's Sparrow
- Sage Thrasher
- Greater Sage-grouse
- Pygmy Rabbit
- Sagebrush Vole
- Gray Flycatcher
- Least Chipmunk
- Vesper sparrow
- Green-tailed towhee

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## Biodiversity in High Elevation Sagebrush Steppe

### Project Goal

- Determine the contribution of high elevation sagebrush steppe to bird and small mammal species diversity patterns



Jason Robinson, Tammy Wilson and Joel Ulmer  
cleaning mammal traps

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## Biodiversity in High Elevation Sagebrush Steppe



Beth Johnson and Tammy Wilson are  
working on the same project, but on  
different aspects

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## Biodiversity in High Elevation Sagebrush Steppe

### Beth's Objectives

#### Determine:

- if high elevation sagebrush steppe functions as a refugium for sagebrush dependent species
- the relationship between meadow characteristics and species composition and relative abundances

Meadow characteristics include:  
veg. characteristics, size,  
shape, edge



Beth Johnson collecting bird data

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## Biodiversity in High Elevation Sagebrush Steppe

### Tammy's Objectives

Determine:

- Geographic context of species richness patterns

Assess the influence meadow arrangement on bird and small mammal diversity and density

(distance to adjacent patches, size of adjacent patches, & landscape context)

#### PATCH ARRANGEMENT

- Connectivity
- Fragmentation
- Surrounding Matrix

Tammy Wilson collecting vegetation data

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## Methods

- Fixed radius bird point counts
- Small mammal trapping
- Vegetation surveys
- 2 field seasons

Joel Ulmer collecting bird data

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## Preliminary Results

Sagebrush species of concern identified in the first field season:

- 214 Brewer's Sparrow (SO) (*Spizella breweri*)
- 65 Least Chipmunk (SO) (*Tamias minimus*)
- 1 Gray Flycatcher (SO) (*Epidonax wrightii*)
- 305 Green-tailed Towhee (SNO) (*Chlorura chlorura*)
- 53 Vesper Sparrow (SNO) (*Pooecetes gramineus*)

SO = sage obligate  
SNO = near obligate

Jason Robinson using GPS

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## Preliminary Results

416 small mammals trapped

- 416 Mammals trapped
  - 256 Deer Mice (*Peromyscus maniculatus*)
  - 65 Least Chipmunks (*Tamias minimus*)
  - 35 Great Basin Pocket Mice (*Perognathus parvus*)
  - 28 Uinta Chipmunks (*Tamias umbrinus*)
  - 11 Southern Red-backed Voles (*Clethrionomys gapperi*)
  - 7 Golden Mantled Ground Squirrels (*Spermophilus lateralis*)
  - 7 Snowshoe Hares (*Lepus americanus*)
  - 3 Uinta Ground Squirrels (*Spermophilus armatus*)
  - 2 Long-Tailed Voles (*Microtus longicaudus*)
  - 1 Short-Tailed weasel or Ermine (*Mustela erminea*)
  - 1 Northern Pocket Gopher (*Thomomys talpoides*)

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## Preliminary Results

Mammal Trap Success (TS) Rates

Overall **15% TS** in 2721 TN  
13 species caught

Sherman **13% TS** in 1275 TN  
9 species caught

Snap **18% TS** in 1275 TN  
10 species caught

Tomahawk **10% TS** in 171 TN  
4 species caught

**TN = Trap Nights**

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## ASSESSING UNDERPASS CROSSING EFFECTIVENESS

on the I-15 Wildcat Underpass Improvement Project

**DIRECT EFFECTS**



INVESTIGATE EFFECTIVENESS OF LINKED SYSTEM OF MITIGATION:

UNDERPASSES  
HIGH FENCES  
ROW ESCAPE RAMPS

TO LESSEN DEER MORTALITY

**2 NEW UNDERPASSES BEING BUILT**

FUNDORS: BLM, UDOT, UDWR

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# METHODS

## ARE THERE INDIRECT EFFECTS?

### INDIRECT EFFECTS

Assess diversity, abundance and densities of small mammal at different distances from the roads

**DO ROAD NOISE & GROUND VIBRATION MAKE A DIFFERENCE ?**

Transect line - 5 trapping webbs

Each trapping line in webbs - 8 stations  
1 Victor snap trap and 1 Sherman live trap at each station

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# Utah Wildlife Road Mortality Hotspots

An analysis of contributing environmental & demographic factors, economic impacts and implications for mitigation and management

**HOTSPOTS**

Chris Kassar

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# Road Mortality-Utah Statistics

**ESTIMATES FROM BASE RATE STATISTICS**

- ~1,575,482 licensed drivers
- ~9,470 estimated deer/vehicle crashes
- 22.3% of total deer killed
- ~8,712 deer killed annually
- ~\$16 Million auto damage
- ~335 human injuries
- ~1.6 human deaths @ \$1.5M = \$2.4 M
- ~\$18.4 million damage

**not counting human injury or deer value**

**CHRIS WILL PUT DEER ROAD KILL INTO A SPATIAL CONTEXT FOR UTAH**

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## 2003 RESEARCH ENDEAVORS

Thomas C. Edwards, Jr.  
USGS Biological Resources Division  
Utah Cooperative Fish and Wildlife Research Unit  
College of Natural Resources  
Utah State University



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## THE 2003 SPATIAL MODELLING LABORATORY

- |                                   |                                      |
|-----------------------------------|--------------------------------------|
| ■ Randall J. Schultz<br>M.S. 2003 | ■ Donald A. Major<br>Ph.D. Candidate |
| ■ David E. Steckel<br>M.S. 2003   | ■ Darren DeBloois<br>M.S. Candidate  |
| ■ Glenn Busch<br>M.S. Candidate   | ■ Phoebe Lehmann<br>M.S. Candidate   |

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## THE 2003 SPATIAL MODELLING LABORATORY

Our new digs!



Thanks to the Janet Quinney Lawson Foundation

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## RARE ECOLOGICAL EVENTS IN TIME AND SPACE



Thomas C. Edwards, Jr.  
USGS BRD UTCFWRU



Richard Cutler, Mathematics &  
Statistics, Utah State University

Cooperators:  
USGS FRESC, USDA Forest Service, NWFP

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## RARE ECOLOGICAL EVENTS IN TIME AND SPACE



- Objectives of the Pacific Northwest Forest Plan's Survey and Manage effort were to obtain information for >350 species of lichens, bryophytes & fungi on:
  - Abundance - at local and regional scales?
  - Spatial distribution - across the area of the Northwest Forest Plan?
  - Persistence – is it ensured?

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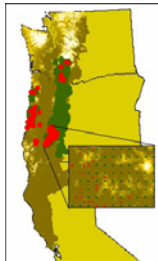
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## RARE ECOLOGICAL EVENTS IN TIME AND SPACE



- Design characteristics
  - Develop models based on FIA, topographic and weather (DAYMET) variables that translate the likelihood of species presence to spatially explicit maps
  - Use maps as basis of stratification for sampling



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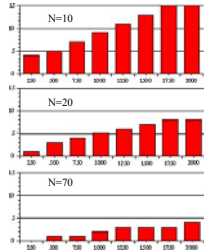
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## RARE ECOLOGICAL EVENTS IN TIME AND SPACE

### Sample sizes and lichen abundance

- Sample sizes necessary for sufficient detections for analysis are large
- Over 2000 sample sites needed to detect 1/3 of lichen species at  $n=10$
- At  $> \$10,000/\text{sample site}$ , go figure .....




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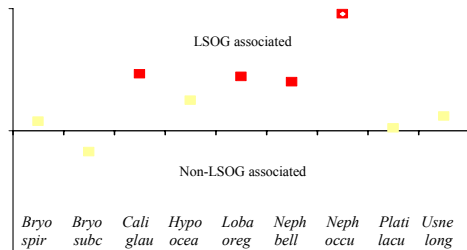
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## RARE ECOLOGICAL EVENTS IN TIME AND SPACE

### Old-forest lichen associations




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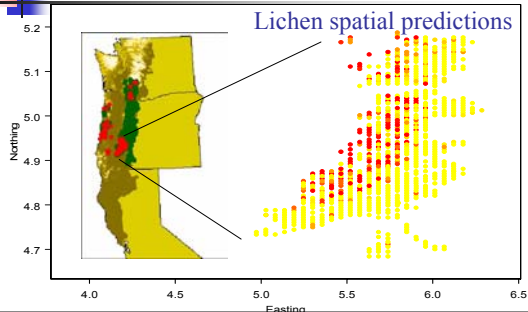
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## RARE ECOLOGICAL EVENTS IN TIME AND SPACE

### Lichen spatial predictions




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## RARE ECOLOGICAL EVENTS IN TIME AND SPACE

### ■ On the negative side:

- Analytical patterns indicated meager information return for investment – decision-makers not impressed
- Information return for cost not defensible – money folks shell-shocked
- Defensible sampling designs often lose out to expediency – a management Hobson's Choice

### Some conclusions




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## RARE ECOLOGICAL EVENTS IN TIME AND SPACE

### Some more conclusions

### ■ On the positive side:

- Decision-makers encountered truly desired scientific information for inclusion in the decision-making process
- Process of evaluating research from statistical, ecological and policy perspectives aided in reaching consensus
- Knowledge of inventorying methods for rare events increasing – and it won't be easy or cheap

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## LINKING FOREST INVENTORY DATA AND WILDLIFE MODELS

Randall J. Schultz, M.S. 2003  
Utah State University



Thomas C. Edwards, Jr.  
USGS BRD UTCFWRU

Gretchen G. Moisen, Tracey S.  
Frescino, Forest Service RMRS




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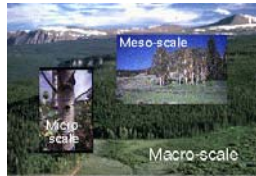
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## FIA DATA AND WILDLIFE MODELS: THE QUESTIONS

- Can spatially explicit maps of FIA-derived variables be used to predict wildlife habitat?
- Do these predictive maps have the same explanatory power of traditional, site-based habitat models?
- How accurate are these models?




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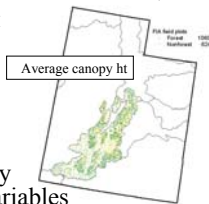
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## FIA DATA AND WILDLIFE MODELS: THE FIA HABITAT LINK

- FIA variables were modeled using several different statistical tools (eg, GAMs, MARS)
- Variables modeled included:
  - Canopy height
  - No. snags
  - Live trees
  - Average tree height
- Models converted to spatially explicit maps of predictor variables




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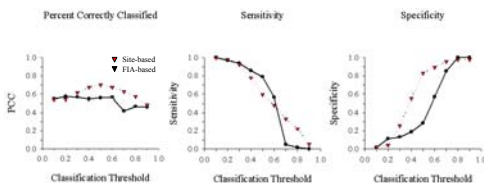
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## FIA DATA AND WILDLIFE MODELS: FIA- VS SITE-BASED MODELS

- Threshold-independent model accuracy based on external field validation:




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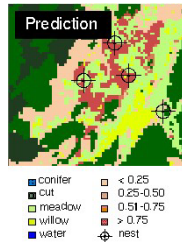
## FIA DATA AND WILDLIFE MODELS: FIA- VS SITE-BASED MODELS

- Model comparisons: are they similar?

	Training	Internal	External
Fit	■		
PCC	■	■	■
Sensitivity	■ FIA	■ FIA	■ FIA
Specificity	■ Site	■ Site	■ Site
AUC	■	■	■

## FIA DATA AND WILDLIFE MODELS: WHAT WE GAIN WITH FIA

- Similar PCC and AUC values indicate Site- and FIA-based models are equal in predictive capability
- FIA-based models, however, have added spatial predictive capabilities not found in Site-based models



## URBAN ENCROACHMENT AND EDWARDS AFB AIR CORRIDORS

David E. Steckel, M.S. 2003  
Utah State University



Thomas C. Edwards, Jr.  
USGS BRD UTCFWRU

Cooperators:  
Department of Defense, USGS

## URBAN ENCROACHMENT AND DOD LANDS: THE CONCERN

- Upcoming DoD Base Realignments in FY05 and establishment of 20 DoD Megabases
- Loss of Edwards AFB means:
  - \$1.4 billion annual income into Antelope Valley
  - Approximately 4,000 jobs
  - Loss of prime airspace for aircraft testing
- Community support necessary to retain Edwards – noise is bad!

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## URBAN ENCROACHMENT AND DOD LANDS: THE OBJECTIVE

- Develop a decision-support system for evaluating the effect of predicted (2020) population growth of six surrounding cities on Edwards AFB flight corridors



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## URBAN ENCROACHMENT AND DoD LANDS: RESULTS

- Sound distribution levels (dBA) for 15 different aircraft were determined
  - Noise isoclines overlaid on projected 2020 growth to identify potential land-use conflicts



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## URBAN ENCROACHMENT AND DoD LANDS: CONCLUSIONS

- Increased planning collaboration needed between Edwards AFB and surrounding cities to avoid future conflicts
- Planning options include:
  - Deflect future growth from flightpaths
  - Direct purchase of land under flightpaths
  - Purchase land and donate to Nature Conservancy
  - Land Tenure Adjustment Project

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## FIRE EFFECTS ON TERRESTRIAL SALAMANDERS



Don Major, Ph.D. Candidate  
Utah State University

Thomas C. Edwards, Jr.  
USGS BRD UTCFWRU



Cooperators:  
USGS FRESC, Joint Fire Science Program

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## FIRE EFFECTS ON TERRESTRIAL SALAMANDERS

### Objectives

- Examine the effects of fire on fuel loadings and salamander habitats
- Compare stand-level salamander abundance and habitat associations
- Examine quality, complexity, and distribution of fuels and habitats under different fire severities
- Model salamander response to simulated changes in forest habitats under different fire severities

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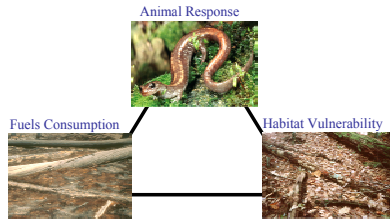
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## FIRE EFFECTS ON TERRESTRIAL SALAMANDERS

Integrated approach exploring 3 aspects



## FIRE EFFECTS ON TERRESTRIAL SALAMANDERS

Implications for Management

- Baseline information on possible effects of fire re-introduction on forest floor structure and associated salamander populations
- Conservation implications to management of Survey & Manage amphibians
- Insights to preparation of fuels management prescriptions and wildland fire rehabilitation strategies

## STATISTICAL EDUCATION WORKSHOPS FOR UT DWR



Darren DeBloois, M.S. Candidate



DWR Biometrician (designee!)

Thomas C. Edwards, Jr.  
USGS BRD UTCFWRU



Cooperators: UT DWR, USU

## STATISTICAL EDUCATION WORKSHOPS FOR UT DWR

- Six modular workshops on continuing education in statistics:
  - Study design
  - Comparing distributions
  - Associative statistics
  - A process for inventorying & monitoring
  - Tools for habitat modelling
  - Tools for population modelling

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## MODELLING FOREST INDICATOR SPECIES



Phoebe Lehmann, M.S. Candidate  
Utah State University

Thomas C. Edwards, Jr.  
USGS BRD UTCFWRU



Gretchen G. Moisen,  
Forest Service RMRS

Cooperators: UT DWR

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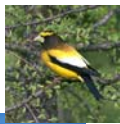
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## MODELLING FOREST INDICATOR SPECIES

- Test efficacy of using presence-only data to model State of Utah forest indicator species
  - Relate presence data to spatially explicit maps of forest habitats
  - Generate psuedo-absences from species range
  - Create species models
  - Perform limited field evaluation




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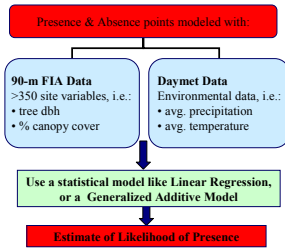
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## MODELLING FOREST INDICATOR SPECIES

- Species selection
  - Forest obligate
  - State or Federal species of concern
  - Sufficient presences for modelling
  - Species of different scales




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## HABITAT MANIPULATION AND SHRUBSTEPPE BIRDS



Russel Norvell, Ph.D. Candidate  
DWR Biologist  
Frank Howe, DWR Avian Section

Thomas C. Edwards, Jr.  
USGS BRD UTCFWRU



Cooperators: USU, BLM, Rich County, Lots more!

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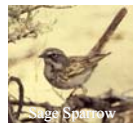
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## HABITAT MANIPULATION AND SHRUBSTEPPE BIRDS

### Objectives

- Determine local, community and landscape bird-habitat associations.
- Assess effects of vegetation treatments and grazing regimes on shrubsteppe bird demography.
- Evaluate different survey methods for application to shrubsteppe birds statewide.




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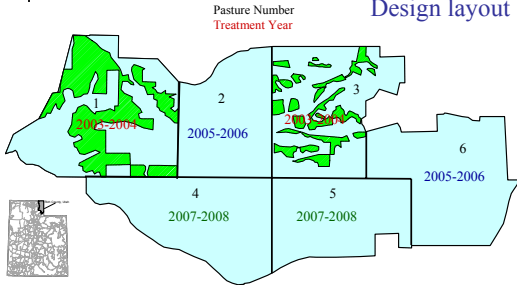
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## HABITAT MANIPULATION AND SHRUBSTEPPE BIRDS

### Design layout




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## HABITAT MANIPULATION AND SHRUBSTEPPE BIRDS

### Analytical Strategy

- Estimate bird species density by habitat category, plus community composition
- Modeling of bird productivity and vegetation:
  - Nest monitoring and spot mapping for birds
  - Vegetation structure and floristics data on the environmental side
- A 'Before-After-Control-Impact' (BACI) design makes use of Rich County habitat manipulations

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## OTHER FUN AND NEWLY DEVELOPING STUFF

- Jaguar movement patterns in Brasil
  - Eric Gese (APHIS) & Sandra Cavalcanti (Brasil)
- Modelling species distributions in Switzerland
  - Antoine Guisan & Niklaus Zimmermann (Suisse)
- Rich County Integrated Assessment, Inventory & Monitoring Program
  - A process for inventorying & monitoring wildlife species and vegetation
  - Lots and lots of collaborators here, including DWR, USU / NRCS, BLM, and more

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## 2003-4 RESEARCH ENDEAVORS

Phaedra Budy  
USGS Biological Resources Division  
Utah Cooperative Fish and Wildlife  
Research Unit  
College of Natural Resources  
Utah State University



## The Fish Ecology Lab

- Gary Thiede, Research Associate and Lab manager
- Peter McHugh, PhD, Logan River Cutthroat
- Robert Al-Chokhachy, PhD, Bull Trout limiting factors and habitat
- Shane Vatland, MS, Lake Powell, shad and bass
- Kris Homel, MS, bull trout genetics and life history
- Erin VanDyke, Undergraduate technician
- Numerous undergraduate technicians

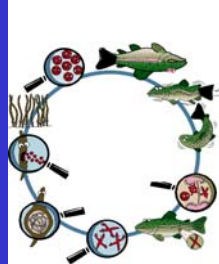
## NATIVE TROUT and the THE LOGAN RIVER



Phaedra Budy  
Gary P. Thiede  
Peter McHugh  
Erin VanDyke  
E.A. de la Hoz

Utah Division of Wildlife Resources

## Why study the Logan River?



res  
clinical signs  
ENVIRONMENT  
susceptibility

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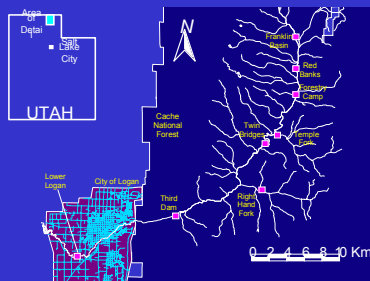
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Figure 1. Logan River




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## Primary Questions:

- How many are there? Is there a trend in abundance?
- What is the distribution and prevalence of WD?
- How do interactions between native and introduced trout affect the health and status of native trout?  
*Pete McHugh*
- How does fish movement affect the distribution and abundance of trout?  
– and the spread and impact of WD in the Logan River?  
*Gary Thiede*

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## METHODS

### *Fish abundance*

- 8 reference sites
- Electroshocking  
Canoe  
Backpack
- Depletion population estimates




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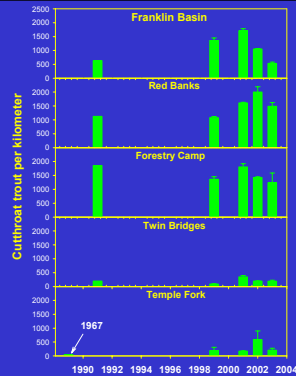
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### Cutthroat trout abundance over the years




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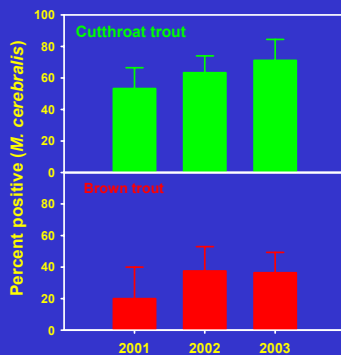
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### Change in prevalence




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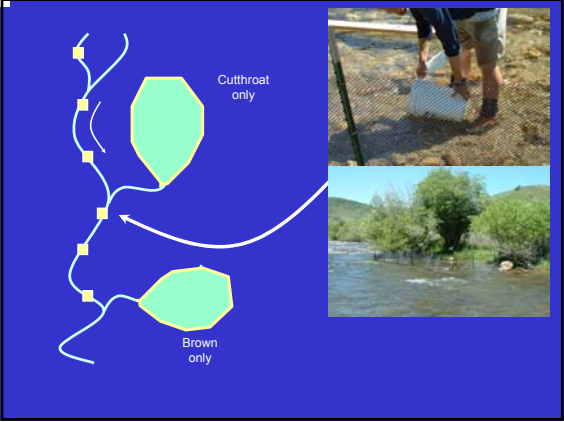
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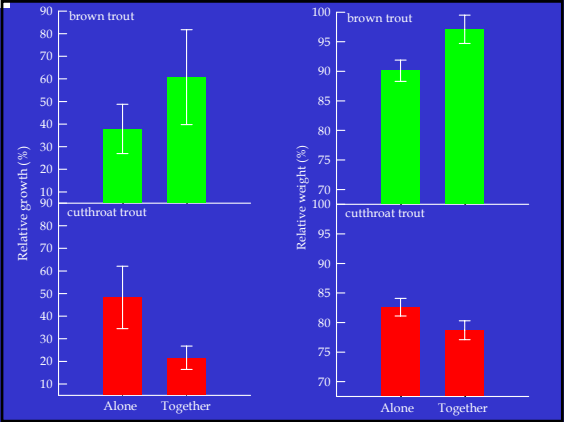
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Number of trout tagged by sample site in the Logan River

Site	Tag color	Number of tagged trout	
		Cutthroat	Brown
Franklin Basin	Green	129	--
Red Banks	Red	216	--
Forestry Camp	Yellow	212	--
Twin Bridges	Blue	23	89
Third Dam	Purple	--	186
Lower Logan	Gray	--	205
Temple Fork	Orange	100	103
R.Hand Fork	White	--	263
Total tagged		680	846
Percentage of population tagged		9%	11%
Electrofishing capture efficiency		55%	70%
Total recaptured		175	212
Tag recovery rate		26%	25%

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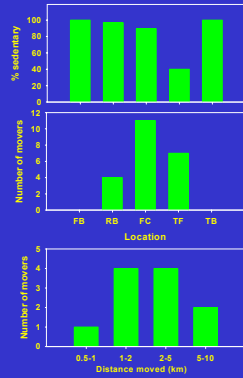
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## Information from tagged cutthroat trout

Logan River  
2002-2003



## Summary:

- Population appears to be stable, no consistent trend (+/-), but still too early. Prevalence of WD continues to increase each year, still no (few) clinical signs. EDHF- WD prevalence is a function of discharge and temperature, changes?
- Our results suggest that CUT are excluded from low elevation sites via competition with BT; BT are simultaneously excluded from high elevation sites because of their own habitat requirements (at a different life stage).
- Most trout show high site fidelity. However, trout that move, travel long distances, potentially transferring WD into prior disease-free areas. The only tested disease-free area is Right Hand Fork. Limited access to this stream may hinder fish movement and therefore keep it disease-free.

Habitat:  
Rearing &  
Spawning  
(life history)

Food  
availability



Predation & Competition

Disease

Complex  
life history  
of Whirling  
Disease

Temperature  
& other  
Physical  
characteristics

Movement and  
Space?

# Predator-Prey Dynamics in Lake Powell: A Bioenergetics Approach

Shane Vatland, Phaedra Budy, Gary Thiede

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## Pelagic Food Web



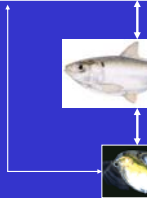
Striped Bass



Threadfin Shad



Zooplankton



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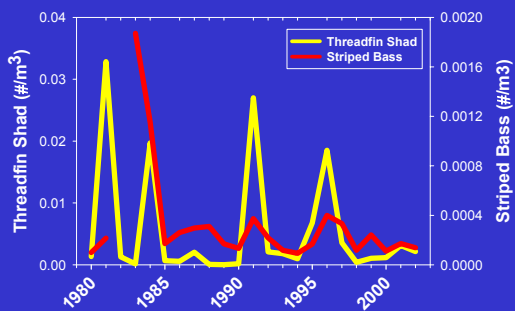
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## Abundance (1980-2002)



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## Research Questions

- Do striped bass respond directly to shad forage?
- Can we quantify shad consumption using bioenergetics?
  - Presently
  - Historically
- Does consumption link trends in the two populations?

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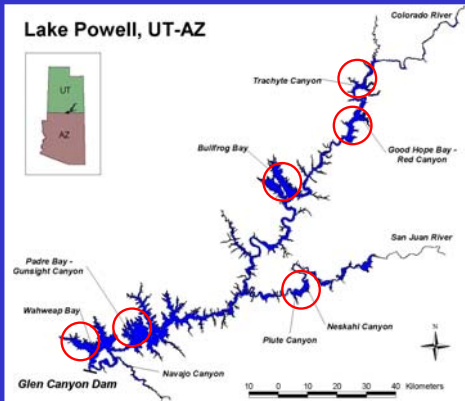
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## Lake Powell, UT-AZ



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## Field Methods

- Gillnetting
  - Range of Depths
  - Variable Mesh Size
- Mid-water Trawling
  - New Moon
- Limnology
  - Temp, DO, Light



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## Bioenergetics Inputs

- **Diets**
  - % diet by wet weight
- **Thermal History**
  - Gillnet catch + temperature profile
- **Growth**
  - Length frequency
  - Historic data




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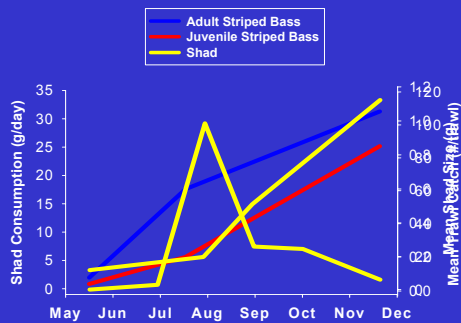
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## 2003 Bioenergetics Results




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## Conclusions

- Striped bass consumption responds directly to shad forage.
- Consumption rates continue to increase even after shad abundance has declined.
- Linking present and past data can provide a methods for understanding and quantifying predator prey cycles.
- Developing a predictive model of striped bass dynamics looks promising.

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Linking bull trout demographics to survival bottlenecks and habitat needs: a template for recovery planning.



Phaedra Budy  
Robert Al-Chokhachy  
Gary P. Thiede  
Kris Homel

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## Two most fundamental questions?

- How many are there ?
- Is the population increasing or decreasing over time ( $\lambda$ )?
- What factors determine above?




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## Approach

- PIT tag data in combo with other tags/ technique= maximize information learned
  - N
  - Trend
  - Growth
  - Survival
  - Emigration
  - Limiting Factors
- Habitat assessment, *available and used*
- 3 watersheds

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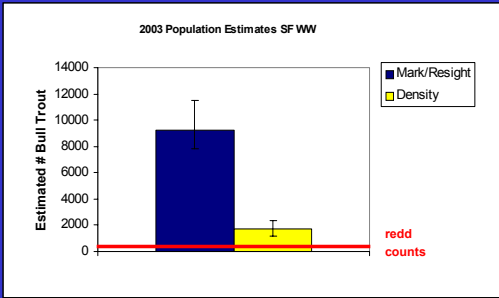
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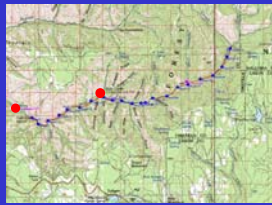
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## Emigration/Movement




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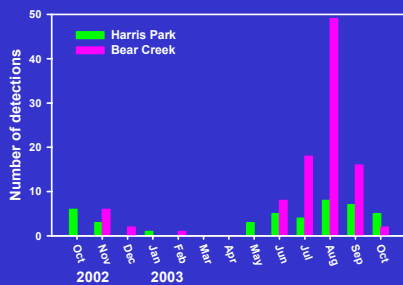
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## Total detections at SF WW antennae




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## SUMMARY

- High proportion of tags are being resighted ( $R/M \approx 40\%$ ), effective technique...
- Much higher estimates of  $N$  compared to redd counts- implications for monitoring and for ESA
- Combining techniques/ tags/methodologies= large increase in the amount of information gained
- Habitat: micro-scale relationships very important, difficult to scale up

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The effects of removal of invasive brook trout on native Colorado River cutthroat trout (*Oncorhynchus clarki pleuriticus*) in a small headwater stream in Utah.



Garn Birchell  
UDWR  
Phaedra Budy

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## Approach

- Reader Creek, Whiterock's drainage
- Multiple pass removal
- Before/ After measurements:
  - Diet
  - Body Condition
  - Distribution
  - Abundance
  - Growth



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## Progress

PASS	BK > 100mm	BK < 100mm	CT > 100 mm	CT < 100 mm
1 <sup>ST</sup>	4,401	1,077	175	20
2 <sup>ND</sup>	1,348	474	43	8
3 <sup>RD</sup>	803	283	31	4
4 <sup>TH</sup>	108	27	0	0
LAST	1,142	328		
TOTAL	7,802	2,189	249	32

- 4 passes completed
- 1<sup>st</sup> three passes 38 days between July 14 – September 12
- 4<sup>th</sup> pass 8 days between October 6 – 29
- 9.2 weeks
- Covered over 42 km (26 miles)