

APPENDIX A: FRESHWATER-DEPENDENT SPECIES DATABASE METHODS

A.1 Overview

The Nature Conservancy of California (TNC) worked with NatureServe to generate a list of all taxa found within the study area and reduced this list to a target list of aquatic and globally or locally rare species, endemic aquatic species, aquatic vertebrates, and aquatic invasive species found within the study area. The target list included genera when species-level taxonomy is uncertain. To be considered “aquatic,” freshwater habitats must be critically important to one or more of a taxon’s life stages.

A.2 Methods

TNC provided an ESRI file geodatabase schema for the project based on the standard ecoregional planning template and a list of species targeted for inclusion in the database. The geodatabase contains a table of species or genus targets (“Elements table”) and a table of data sources, as well as point, polygon, and line feature classes related to species occurrences. The Elements table also contains a unique species ID, up to two common names, up to two scientific names, conservation status, and taxonomic groupings.

TU acquired spatial data (GIS format or tabular data easily converted to GIS format) related to the occurrence or distribution of target taxa primarily through web searches for original data. In most cases, we were able to download data directly over the web. Other data sources required specific requests to individuals, particularly for data referenced in scientific literature. Natural Heritage program data for Arizona and Nevada required custom queries performed by Natural Heritage program staff. Table 1 lists the data sources used to populate the geodatabase.

Once we identified a data source, we used a series of general GIS data management steps to insert the appropriate data into the geodatabase. We downloaded primary data, archived it by source in its native format, and maintained information regarding data sharing permissions. We then joined these original data to the Species table by species name to identify the records within the source data that corresponded to species on the assessment target list. Next, we added a new field to the source data and attributed this field to equal the unique element ID within the Element table. Since some scientific and common names have changed over time for an individual species, we repeated this join and attribute calculation for all available names in the source data and Element table. Similarly, we added new fields to the original data source related to habitat use type, observation type, and format type and attributed these corresponding to information contained in the original data. Table 1 describes the attributes used within the geodatabase for habitat use type, observation type, and format type. We also added an additional field that combines all of these fields to create a unique identifier for each record that can be parsed to identify species, habitat use type, observation type, and format type (see Table 1). These newly calculated fields directly corresponded to the geodatabase schema and allowed us to append the new data to the appropriate geodatabase feature classes. We also appended additional information from the original data, including data quality, accuracy, and any original identification or coding information, and added a field to identify the source data. Table 2 lists data sources in order of

Table 1: Freshwater-dependent species database attribute coding

Category	Value
Habitat Use	Undefined
	Spawning
	Migration
	Natal (Juvenile)
	Non-natal (Adult)
	Seasonal
Observation Type	Unknown
	Current (post-1979)
	Modeled Habitat/Generalized Observation
	Range (Current or Unknown Period)
	Observation with undefined date
	Historical Range
	Professional Judgement
	Critical Habitat, Management Unit, or Management Area Designation
	Historical Observation (pre-1980)
	Extirpated
Format	Point
	Line
	Polygon
Origin	Native to study area
	Native to study area, but outside native range
	Non-native/exotic to study area

the unique source ID assigned to each and describes additional data management steps required for some data sources.

After we added all the data to the geodatabase, we intersected each of the three feature classes (point, line, and polygon) with a subwatershed layer (watershed boundary dataset 12-digit hydrologic unit; NRCS, USGS, and EPA 2011) for the study area and summarized to quantify the number of point records, area of polygon records (hectares), and length of line records (meters) for each species in each subwatershed. We queried this summary to identify the number of unique species found in each subwatershed – the species richness - by species type (e.g. native or non-native).

The Nature Conservancy has created an [atlas](#) of the patterns of freshwater biodiversity in California based on the database and produced a [publicly available version of the database](#). The public version of the database provides data summaries of a reduced set of data coarsened to the watershed scale (10-digit hydrologic unit), corresponding to the desire of some data providers that their data not be publicly available or not be represented at finer scales. Additionally, we will submit an article to a scientific journal describing the database and findings from the data summary.

Table 2: Data sources used to populate the freshwater-dependent species database

Name	Citation
<i>California Natural Diversity Database (2/2011)</i>	<i>CDFG. 2011. California Natural Diversity Database, February 2011 version. California Department of Fish and Game, Sacramento, CA.</i>
<i>USDA Plants, USDA PLANTS Database</i>	<i>USDA NRCS, USDA PLANTS Database. National Plant Data Team, Greensboro, NC. (accessed through GBIF portal, http://data.gbif.org/datasets/resource/1066, 2012-05-27)</i>
<i>Calflora</i>	<i>Calflora. 2008. The Calflora Database. Berkeley, CA. Available: http://www.calflora.org/ (Accessed: July 18, 2012).</i>
<i>USGS Nonindigenous Aquatic Species</i>	<i>USGS. 2011. Nonindigenous Aquatic Species Database. US Geological Survey Southeast Ecological Science Center, Gainesville, FL.</i>
<i>Berkeley Natural History Museums, UCJEPS TAPIR Provider</i>	<i>Berkeley Natural History Museums, UCJEPS TAPIR Provider. Berkeley, CA. (accessed through GBIF portal, http://data.gbif.org/datasets/resource/1413, 2012-05-27)</i>
<i>Utah State Bug Lab</i>	<i>Western Center for Monitoring & Assessment of Freshwater Ecosystems. 2009. WMC and NAMC Joint Database. Utah State University, Logan, UT</i>
<i>SWAMP data</i>	<i>California State Water Resources Control Board. 2012. Surface Water Ambient Monitoring Program (SWAMP) database, April 30, 2012 version. Moss Landing Marine Laboratory, Monterey, CA.</i>
<i>Los Angeles County Museum of Natural History, Vertebrate specimens</i>	<i>Los Angeles County Museum of Natural History, Vertebrate specimens. Los Angeles, CA. (accessed through GBIF portal, http://data.gbif.org/datasets/resource/14305, 2012-05-27)</i>
<i>BIOS Tuolumne aquatic surveys ds193</i>	<i>CDFG. 2009. Tuolumne Aquatic Resources Relational Inventory. CA Department of Fish and Game, Sacramento, CA.</i>
<i>Occurrences approx. from NatureServe Explorer descriptions</i>	<i>NatureServe. 2012. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer.(Accessed: 7/16/2012)</i>
<i>Range approx. from NatureServe Explorer descriptions</i>	<i>NatureServe. 2012. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer.(Accessed: 7/16/2012)</i>
<i>Unmack CO River museum fish specimens</i>	<i>Unmack, PJ. 2002. Lower Colorado Basin GIS Fish Data. Arizona State University, Tempe, AZ.</i>
<i>Berkeley Natural History Museums, Essig Museum of Entemology TAPIR Provider</i>	<i>Berkeley Natural History Museums, Essig Museum of Entemology TAPIR Provider. Berkeley, CA. (accessed through GBIF portal, http://data.gbif.org/datasets/resource/1411, 2012-05-27)</i>
<i>Santa Barbara Museum of Natural History</i>	<i>Santa Barbara Museum of Natural History. Santa Barbara, CA. (accessed through GBIF portal, http://data.gbif.org/datasets/resource/646, 2012-05-27)</i>

Name	Citation
NatureServe	NatureServe. 2011. Species occurrence by HUC8s (subbasins). Direct request to NatureServe, Arlington, VA.
NatureServe Multi-Jurisdictional Dataset	NatureServe Multi-Jurisdictional Dataset. NatureServe. Arlington, VA.
California Wildlife Habitat Relationships	California Department of Fish and Game. 2009. California Wildlife Habitat Relationships System. California Interagency Wildlife Task Group, Sacramento, CA.
California Academy of Sciences, CAS Herpetology Collection Catalog	California Academy of Sciences, CAS Herpetology Collection Catalog. San Francisco, CA. (accessed through GBIF portal, http://data.gbif.org/datasets/resource/27 , 2012-05-27)
National Museum of Natural History, Smithsonian Institution, NMNH Vertebrate Zoology Fishes Collections	National Museum of Natural History, Smithsonian Institution, NMNH Vertebrate Zoology Fishes Collections. Washington, DC. (accessed through GBIF portal, http://data.gbif.org/datasets/resource/1836 , 2012-05-27)
Arctos, MVZ Herp Collection	Arctos, MVZ Herp Collection. (accessed through GBIF portal, http://data.gbif.org/datasets/resource/8123 , 2012-05-27)
Smithsonian Institution, National Museum of Natural History – Department of Invertebrate Zoology	National Museum of Natural History, Smithsonian Institution, NMNH Invertebrate Zoology Collections. Washington, DC. (accessed through GBIF portal, http://data.gbif.org/datasets/resource/1834 , 2012-05-27)
FishBase, Fishbase	FishBase, Fishbase. (accessed through GBIF portal, http://data.gbif.org/datasets/resource/1602 , 2012-05-27)
San Diego Natural History Museum, Herp Specimens	San Diego Natural History Museum, Herp Specimens. San Diego, CA. (accessed through GBIF portal, http://data.gbif.org/datasets/resource/642 , 2012-05-27)
Oregon State University, Vascular Plant Collection	Oregon State University, Vascular Plant Collection. Corvallis, OR. (accessed through GBIF portal, http://data.gbif.org/datasets/resource/622 , 2012-05-27)
NV Natural Heritage Program	Nevada Natural Heritage Program. 2011. Biotics . Nevada Dept of Conservation and Natural Resources, Carson City, NV.
PISCES - UC Davis	Katz, JVE et al. 2012. PISCES. University of California - Davis, Davis, CA
National Museum of Natural History, Smithsonian Institution, NMNH Vertebrate Zoology Herpetology Collections	National Museum of Natural History, Smithsonian Institution, NMNH Vertebrate Zoology Herpetology Collections. Washington, DC. (accessed through GBIF portal, http://data.gbif.org/datasets/resource/1838 , 2012-05-27)
Oregon Natural Heritage Program 2010 (from TNC)	Oregon Biodiversity Information Center. 2010. Natural Heritage Data System, July 2010 version. Portland State University, Portland, OR.
USFWS Critical Habitat Designation	USFWS. 2011. Final Critical Habitat. US Fish and Wildlife Service, Fort Collins, CO.
Tulane University Museum of Natural History, Tulane University Museum of Natural History	Tulane University Museum of Natural History, Tulane University Museum of Natural History. New Orleans, LA. (accessed through GBIF portal, http://data.gbif.org/datasets/resource/8077 , 2012-05-27)

Name	Citation
Utah State University, USU-UTC Specimen Database	Utah State University, USU-UTC Specimen Database. Logan, UT. (accessed through GBIF portal, http://data.gbif.org/datasets/resource/1508 , 2012-05-27)
Leidy SF Bay data	Leidy, RA. 2007. <i>Ecology, Assemblage Structure, Distribution, and Status of Fishes in Stream Tributary to the San Francisco Estuary</i> , CA. San Francisco Estuary Institute, San Francisco, CA.
University of Kansas Biodiversity Research Center, Fish Collection	University of Kansas Biodiversity Research Center, Fish Collection. Lawrence, KS. (accessed through GBIF portal, http://data.gbif.org/datasets/resource/14304 , 2012-05-27)
SW Regional GAP Wildlife Habitat Relationship	Boykin, KG, et al. 2007. <i>Predicted animal-habitat distributions and species richness</i> . Chapter 3 in JS Prior-Magee, et al. eds. <i>Southwest Regional Gap Analysis Final Report</i> . US Geological Survey, Moscow, ID.
Oregon GAP Analysis Wildlife Models	Oregon Biodiversity Information Center. 2004. <i>GAP Wildlife Models</i> . Portland State University, Portland, OR
NDOW Wildlife Action Plan 2012 revision	NDOW. 2012. <i>Nevada Wildlife Action Plan</i> . Nevada Department of Wildlife, Reno, NV.
California Natural Diversity Database (2/2012)	CDFG. 2012. <i>California Natural Diversity Database, February 2012 version</i> . California Department of Fish and Game, Sacramento, CA.
James R. Slater Museum of Natural History, Terrestrial Vertebrates	James R. Slater Museum of Natural History, Terrestrial Vertebrates. Tacoma, WA. (accessed through GBIF portal, http://data.gbif.org/datasets/resource/1465 , 2012-05-27)
Canadian Museum of Nature, Canadian Museum of Nature Fish Collection	Canadian Museum of Nature, Canadian Museum of Nature Fish Collection. Ottawa, Canada. (accessed through GBIF portal, http://data.gbif.org/datasets/resource/121 , 2012-05-27)
Ocean Biogeographic Information System, Canadian Museum of Nature - Fish Collection (OBIS Canada)	Ocean Biogeographic Information System, Canadian Museum of Nature - Fish Collection (OBIS Canada). (accessed through GBIF portal, http://data.gbif.org/datasets/resource/344 , 2012-05-27)
University of Arizona, UA Herbarium	University of Arizona, UA Herbarium. Tucson, AZ. (accessed through GBIF portal, http://data.gbif.org/datasets/resource/7900 , 2012-05-27)
Moyle Fish Ranges	Moyle, P and Randall, P. 1997. <i>Fish Biodiversity Maps</i> . University of California - Davis, Davis, CA
Subterranean Institute database	Graening, G.O. et al. 2012. <i>Unpublished data, database report</i> . The Subterranean Institute, Citrus Heights, CA.
NPS Klamath Network Herp surveys 2002	Bury, RB, LC Gangle III, and S Litrakis. 2002. <i>Inventory for Amphibians and Reptiles in the NPS Klamath Network</i> . US Geological Survey, Corvallis, OR.
Sierra NV Nat Forests Critical Aquatic Refuges	USFS. 2006. <i>Critical Aquatic Refuges in Sierra Nevada National Forests</i> . US Forest Service Pacific Southwest Region - Remote Sensing Lab, McClellan, CA.

Name	Citation
<i>Salmon ESU and Steelhead DPS Boundaries</i>	NMFS. 2005. <i>Salmon Evolutionarily Significant Unit and Steelhead Distinct Population Segment Boundaries</i> . National Marine Fisheries Service, Northwest Regional Office, Seattle, WA.
Academy of Natural Sciences, MAL	Academy of Natural Sciences, MAL. Philadelphia, PA. (accessed through GBIF portal, http://data.gbif.org/datasets/resource/2006 , 2012-05-27)
CNDDDB flagged "Sensitive"	CDFG. 2012. <i>California Natural Diversity Database, February 2012 version</i> . California Department of Fish and Game, Sacramento, CA.
<i>Status and Dist. of Native Fishes - Goose Lake</i>	Sheerer, PD, SL Gunckel, MP Heck, and SE Jacobs. 2010. <i>Status and Distribution of Native Fishes in the Goose Lake Basin, Oregon</i> . <i>Northwestern Naturalist</i> 91:271-287.
<i>Cornell University Museum of Vertebrates, Amphibians and Reptiles Collection</i>	Cornell University Museum of Vertebrates, Amphibians and Reptiles Collection . Ithica, NY. (accessed through GBIF portal, http://data.gbif.org/datasets/resource/133 , 2012-05-27)
MSI Fish Trawl Data	Marine Science Institute. 2008. <i>MSI Fish Trawl Data (1970 - 2008)</i> . Redwood City, CA.
<i>Museum of Comparative Zoology, Harvard University, MCZ Herpetology Collection</i>	Museum of Comparative Zoology, Harvard University, MCZ Herpetology Collection. Boston, MA. (accessed through GBIF portal, http://data.gbif.org/datasets/resource/14100 , 2012-05-27)
Western Oregon Plan - BLM	BLM. 2006. <i>Western Oregon Plan Revision - Federally Listed, Endangered, or Candidate Species Points</i> . BLM, Salem, OR
<i>Oregon Natural Heritage Program 2011 (from TNC)</i>	Oregon Biodiversity Information Center. 2011. <i>Natural Heritage Data System, May 2011 version</i> . Portland State University, Portland, OR.
BIOS Herps ds694	Groff, L. 2010. <i>Herptofauna Surveys, Northern California</i> . Humboldt State University, Arcata, CA.
<i>University of Kansas Biodiversity Institute, Botany Vascular Plant Collection</i>	University of Kansas Biodiversity Institute, Botany Vascular Plant Collection. Lawrence, KS. (accessed through GBIF portal, http://data.gbif.org/datasets/resource/7915 , 2012-05-27)
<i>University of Nevada, Reno, UNR Herpetology</i>	University of Nevada, Reno, UNR Herpetology. Reno, NV. (accessed through GBIF portal, http://data.gbif.org/datasets/resource/14188 , 2012-05-27)
<i>Museum of Comparative Zoology, Harvard University, MCZ Herpetology Collection - Amphibian Database</i>	Museum of Comparative Zoology, Harvard University, MCZ Herpetology Collection - Amphibian Database. Boston, MA. (accessed through GBIF portal, http://data.gbif.org/datasets/resource/14100 , 2012-05-27)
Nevada Wildlife Action Plan	NDOW. 2006. <i>Nevada Wildlife Action Plan</i> . Nevada Department of Wildlife, Reno, NV.
<i>South African Institute for Aquatic Biodiversity - Fish Collection (AfrOBIS)</i>	South African National Biodiversity Institute, The South African Institute for Aquatic Biodiversity. Grahamstown, South Africa. (accessed through GBIF portal, http://data.gbif.org/datasets/resource/400 , 2012-05-27)
AZ Natural Heritage Program	ADGF. 2011. <i>Arizona Natural Heritage Program Heritage Data Management System</i> . Arizona Dept. of Game and Fish, Pheonix, AZ.

Name	Citation
<i>Hovingh surveys</i>	<i>Hovingh, P. 2012. Field surveys of Great Basin spring habitats. Direct request to Peter Hovingh, Salt Lake City, UT.</i>
<i>North Carolina State Museum of Natural Sciences, North Carolina State Museum of Natural Sciences Fishes Collection</i>	<i>North Carolina State Museum of Natural Sciences, North Carolina State Museum of Natural Sciences Fishes Collection. Raleigh, NC. (accessed through GBIF portal, http://data.gbif.org/datasets/resource/8099, 2012-05-27)</i>
<i>University of Colorado Museum of Natural History, CUMNH Herpetology Collection</i>	<i>University of Colorado Museum of Natural History, CUMNH Herpetology Collection. Boulder, CO. (accessed through GBIF portal, http://data.gbif.org/datasets/resource/2556, 2012-05-27)</i>
<i>Royal Ontario Museum, Herp specimens</i>	<i>Royal Ontario Museum, Herp specimens. Toronto, Canada. (accessed through GBIF portal, http://data.gbif.org/datasets/resource/659, 2012-05-27)</i>
<i>Modoc National Forest TES Fish</i>	<i>USFS. 2007. Modoc National Forest TES Fish. Modoc National Forest internal document, Alturas, CA.</i>
<i>StreamNet</i>	<i>StreamNet. 2010. Generalized Fish Distribution - All Species Combined, July 2010 version. Pacific States Marine Fisheries Commission, Portland, OR.</i>
<i>SFEI San Francisco Bay Benthic Data</i>	<i>San Francisco Estuary Institute. 2008. SFEI San Francisco Bay Benthic Data (1992 - 2008). San Francisco, CA.</i>
<i>US National Plant Germplasm System, United States National Plant Germplasm System Collection</i>	<i>US National Plant Germplasm System, United States National Plant Germplasm System Collection. (accessed through GBIF portal, http://data.gbif.org/datasets/resource/1429, 2012-05-27)</i>
<i>University of Washington Burke Museum, Vascular Plant Collection - University of Washington Herbarium (WTU)</i>	<i>University of Washington Burke Museum, Vascular Plant Collection - University of Washington Herbarium (WTU). Seattle, WA. (accessed through GBIF portal, http://data.gbif.org/datasets/resource/126, 2012-05-27)</i>
<i>BIOS Wildlife surveys ds325</i>	<i>Garrison, BA. 2005. Wildlife Surveys - CDFG Lands, Region 2. CA Department of Fish and Game, Sacramento, CA.</i>
<i>BIOS d428 Salton Sea</i>	<i>CDFG. 2008. Quarterly Fishery Surveys - Salton Sea. CA Department of Fish and Game, Sacramento, CA.</i>
<i>GBIF-Sweden, NRM-Fishes</i>	<i>Swedish Museum of Natural History, NRM-Fishes. Stockholm, Sweden. (accessed through GBIF portal, http://data.gbif.org/datasets/resource/1023, 2012-05-27)</i>
<i>Sternberg Museum of Natural History, Herp Collection</i>	<i>Sternberg Museum of Natural History, Herp Collection. Hays, KS. (accessed through GBIF portal, http://data.gbif.org/datasets/resource/746, 2012-05-27)</i>
<i>Yale University Peabody Museum, Peabody Herpetology DiGIR Service</i>	<i>Yale University Peabody Museum, Peabody Herpetology DiGIR Service. New Haven, CT. (accessed through GBIF portal, http://data.gbif.org/datasets/resource/1825, 2012-05-27)</i>
<i>Royal Ontario Museum, Fish specimens</i>	<i>Royal Ontario Museum, Fish specimens. Toronto, Canada. (accessed through GBIF portal, http://data.gbif.org/datasets/resource/660, 2012-05-27)</i>

Name	Citation
<i>Historical and present distribution salmon CV CA</i>	Yoshiyama RM, et al. 2001. <i>Historical and present distribution of chinook salmon in the Central Valley drainage of CA</i> , Fish Bulletin 179: Contributions to the biology of Central Valley salmonids, vol 1: 71-176
<i>ODFW Redband Trout Distribution</i>	Oregon Department of Fish and Wildlife. 2011. <i>Oregon Fish Habitat Distribution: Redband Trout</i> . ODFW, Salem, OR.
<i>Canadian Museum of Nature, Canadian Museum of Nature Amphibian and Reptile Collection - Anura</i>	Canadian Museum of Nature, Canadian Museum of Nature Amphibian and Reptile Collection - Anura. Ottawa, Canada. (accessed through GBIF portal, http://data.gbif.org/datasets/resource/120 , 2012-05-27)
<i>Museum national d'histoire naturelle et Reseau des Herbiers de France, Ichtyologie</i>	Museum national d'histoire naturelle et Reseau des Herbiers de France, Ichtyologie. (accessed through GBIF portal, http://data.gbif.org/datasets/resource/1507 , 2012-05-27)
<i>Canadian Museum of Nature, Canadian Museum of Nature Mollusc Collection - Unionoida</i>	Canadian Museum of Nature, Canadian Museum of Nature Mollusc Collection - Unionoida. Ottawa, Canada. (accessed through GBIF portal, http://data.gbif.org/datasets/resource/122 , 2012-05-27)
<i>Arctos, MVZ Milton Hildebrand Collection</i>	Arctos, MVZ Milton Hildebrand Collection. (accessed through GBIF portal, http://data.gbif.org/datasets/resource/8125 , 2012-05-27)
<i>Ocean Biogeographic Information System, South African Institute for Aquatic Biodiversity - Fish Collection (AfrOBIS)</i>	Ocean Biogeographic Information System, South African Institute for Aquatic Biodiversity - Fish Collection (AfrOBIS). (accessed through GBIF portal, http://data.gbif.org/datasets/resource/400 , 2012-05-27)
<i>Wildobs</i>	WildObs.com observations
<i>Jeanette "Mussel Sites 2009 Final"</i>	Howard, JK. 2010. <i>Sensitive Freshwater Mussel Surveys in the Pacific Southwest Region: Assessment of Conservation Status ("Mussel Sites 2009 Final")</i> . The Nature Conservancy, San Francisco, CA.
<i>Jeanette "Forest Service Mussel Sites 062810v2"</i>	Howard, JK. 2010. <i>Sensitive Freshwater Mussel Surveys in the Pacific Southwest Region: Assessment of Conservation Status ("Forest Service Mussel Sites 062810v2")</i> . The Nature Conservancy, San Francisco, CA.
<i>Jeanette "Mussel Sites Final"</i>	Howard, JK. 2010. <i>Sensitive Freshwater Mussel Surveys in the Pacific Southwest Region: Assessment of Conservation Status ("Mussel Sites Final")</i> . The Nature Conservancy, San Francisco, CA.
<i>Arizona Freshwater Assessment 2.0</i>	Turner, DS and MD Turner. 2007. <i>Habitat mapping and conservation analysis to identify critical streams for Arizona's native fish</i> . Aquatic Conservation: Marine and Freshwater Ecosystems 17: 737-748.
<i>Winter Steelhead Distribution</i>	CalFish. 2010. <i>Steelhead Distribution and Range - Winter, December 2010 version</i> . CA Department of Fish and Game, Sacramento, CA.
<i>Chinook Abundance</i>	CalFish. 2010. <i>Chinook Abundance (Trends), October 2005 version</i> . CA Department of Fish and Game, Sacramento, CA.
<i>BIOS mussel sites 2010 ds662</i>	Krall, M, C Tennant, and ML Westover. 2010. <i>Mussel Sites, Klamath River - 2010</i> . Whitman College, Walla Walla, WA.

Name	Citation
<i>Avian Knowledge Network, Macaulay Library - Audio Data</i>	<i>Avian Knowledge Network, Macaulay Library - Audio Data. (accessed through GBIF portal, http://data.gbif.org/datasets/resource/41, 2012-05-27)</i>
<i>Zoological Institute, Russian Academy of Sciences, St. Petersburg, Amphibian specimens</i>	<i>Zoological Institute, Russian Academy of Sciences, St. Petersburg, Amphibian specimens. St. Petersburg, Russia. (accessed through GBIF portal, http://data.gbif.org/datasets/resource/12787, 2012-05-27)</i>
<i>Coho Distribution</i>	<i>CalFish. 2010. Coho Distribution and Range, December 2010 version. CA Department of Fish and Game, Sacramento, CA.</i>
<i>Summer Steelhead Distribution</i>	<i>CalFish. 2010. Steelhead Distribution and Range - Summer, October 2009 version. CA Department of Fish and Game, Sacramento, CA.</i>
<i>BIOS mussel sites 2007 ds661</i>	<i>Krall, M, C Tennant, and ML Westover. 2007. Mussel Sites, Klamath River - 2007. Whitman College, Walla Walla, WA.</i>
<i>BIOS ds323</i>	<i>Garrison, BA. 2005. Herp Coverboard Sampling - Spears and Didion Ranches. CA Department of Fish and Game, Sacramento, CA.</i>
<i>Fairy Shrimps of CA's Puddles, Pools, and Playas</i>	<i>Eriksen, C. and D. Belk. 1999. Fairy Shrimps of California's Puddles, Pools, and Playas. Mad River Press, Eureka, CA.</i>
<i>Australian National Herbarium (CANB)</i>	<i>Australian National Herbarium (CANB). Canberra, Australia. (accessed through GBIF portal, http://data.gbif.org/datasets/resource/47, 2012-05-27)</i>
<i>Canadian Museum of Nature, Canadian Museum of Nature Herbarium</i>	<i>Canadian Museum of Nature, Canadian Museum of Nature Herbarium. Ottawa, Canada. (accessed through GBIF portal, http://data.gbif.org/datasets/resource/123, 2012-05-27)</i>
<i>Illinois Natural History Survey</i>	<i>Illinois Natural History Survey. Champaign, IL. (accessed through GBIF portal, http://data.gbif.org/datasets/resource/13517, 2012-05-27)</i>
<i>iNaturalist.org, iNaturalist research-grade observations</i>	<i>iNaturalist.org, iNaturalist research-grade observations by Chris Brown, Scott Loarie, Ken-ichi Ueda, and Erik Hunt. (accessed through GBIF portal, http://data.gbif.org/datasets/resource/14026, 2012-05-27)</i>
<i>Marine Science Institute, UCSB, Paleobiology Database</i>	<i>Marine Science Institute, UCSB, Paleobiology Database . Santa Barbara, CA. (accessed through GBIF portal, http://data.gbif.org/datasets/resource/563, 2012-05-27)</i>
<i>Ocean Biogeographic Information System, Academy of Natural Sciences OBIS Mollusc Database</i>	<i>Ocean Biogeographic Information System, Academy of Natural Sciences OBIS Mollusc Database. (accessed through GBIF portal, http://data.gbif.org/datasets/resource/337, 2012-05-27)</i>
<i>OZCAM (Online Zoological Collections of Australian Museums) Provider</i>	<i>Australian Museum, OZCAM (Online Zoological Collections of Australian Museums) Provider. Sydney, Australia. (accessed through GBIF portal, http://data.gbif.org/datasets/resource/14113, 2012-05-27)</i>
<i>Museum of Comparative Zoology, Harvard University, MCZ Ichthyology Collection</i>	<i>Museum of Comparative Zoology, Harvard University, MCZ Ichthyology Collection. Boston, MA. (accessed through GBIF portal, http://data.gbif.org/datasets/resource/14100, 2012-05-27)</i>
<i>Moyle and Reed, observations</i>	<i>Personal observations from Peter Moyle and Stewart Reed</i>

Name	Citation
<i>USFWS Paiute Cutthroat 5-year Status Review</i>	<i>USFWS. 2007. Paiute Cutthroat Trout 5-Year Review: Summary and Evaluation. US Fish and Wildlife Service, Reno, NV.</i>
<i>Cons. Plan for Pine Cr & Eagle Lake RB Trout</i>	<i>Pustejovsky, T. 2007. A Conservation Plan for Pine Creek and Eagle Lake Rainbow Trout. Lassen County Resource Advisory Council, Susanville, CA.</i>
<i>McCloud Redband Trout Distribution</i>	<i>USFS. 2007. McCloud Redband Trout Distribution. Shasta National Forest internal document, Redding, CA.</i>
<i>California Coastal Chinook Distribution</i>	<i>NMFS. 2005. California Coastal Chinook Distribution, June 2005 version. National Marine Fisheries Service, Southwest Regional Office, Santa Rosa, CA.</i>
<i>Northern California Steelhead Distribution</i>	<i>NMFS. 2005. Northern California Steelhead Distribution, June 2005 version. National Marine Fisheries Service, Southwest Regional Office, Santa Rosa, CA.</i>
<i>Central California Coast Steelhead Distribution</i>	<i>NMFS. 2005. California Central Coast Steelhead Distribution, June 2005 version. National Marine Fisheries Service, Southwest Regional Office, Santa Rosa, CA.</i>
<i>South Central CA Coast Steelhead Distribution</i>	<i>NMFS. 2005. South Central California Coast Steelhead Distribution, June 2005 version. National Marine Fisheries Service, Southwest Regional Office, Santa Rosa, CA.</i>
<i>Southern California Steelhead Distribution</i>	<i>NMFS. 2005. Southern California Steelhead Distribution, June 2005 version. National Marine Fisheries Service, Southwest Regional Office, Santa Rosa, CA.</i>
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<i>Central Valley Spring Run Chinook Distribution</i>	<i>NMFS. 2005. Central Valley Spring Run Chinook Distribution, June 2005 version. National Marine Fisheries Service, Southwest Regional Office, Santa Rosa, CA.</i>
<i>BIOS Western Pond Turtle ds313</i>	<i>CDFG. 2010. Western Pond Turtle Observations - Region 1. CA Department of Fish and Game, Redding, CA.</i>
<i>BIOS ds431</i>	<i>Spiegelberg, M. 2009. Sensitive Wildlife - Center for Natural Lands Management. Center for Natural Lands Management, San Diego, CA.</i>
<i>BIOS San Diego plants ds121</i>	<i>San Diego Dept. of Planning and Land Use. 2005. Species on Multiple Species Conservation Planning preserves. San Diego Department of Planning and Land Use, San Diego, CA.</i>
<i>BIOS ds458</i>	<i>Spiegelberg, M. 2007. Sensitive Plants - Center for Natural Lands Management. Center for Natural Lands Management, San Diego, CA.</i>
<i>BIOS ds324</i>	<i>Garrison, BA. 2006. Herp Coverboard Sampling - Spears and Didion Ranches. CA Department of Fish and Game, Sacramento, CA.</i>
<i>USGS de la Cruz SF Bay Benthic Data</i>	<i>De la Cruz, S. 2008. San Francisco Bay Benthic Data (2003 - 2006). USGS, Dixon, CA.</i>
<i>Lahontan Cutthroat Trout Distribution Sept 2010</i>	<i>Lahontan Cutthroat Trout Status Assessment Team. 2010 LCT Conservation Populations, 9/2010. USFWS, Reno, NV.</i>

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<i>Comision Nacional para el Conocimiento y Uso de la Biodiversidad, Herbario del CIBNOR</i>	<i>Comision Nacional para el Conocimiento y Uso de la Biodiversidad, Herbario del CIBNOR. La Paz, Mexico. (accessed through GBIF portal, http://data.gbif.org/datasets/resource/11124, 2012-05-27)</i>
<i>Michigan State University Museum, Vertebrate specimens</i>	<i>Michigan State University Museum, Vertebrate specimens. East Lansing, MI. (accessed through GBIF portal, http://data.gbif.org/datasets/resource/541, 2012-05-27)</i>
<i>National Museum of Natural History, Smithsonian Institution, NMNH Botany Collections</i>	<i>National Museum of Natural History, Smithsonian Institution, NMNH Botany Collections. Washington, DC. (accessed through GBIF portal, http://data.gbif.org/datasets/resource/1874, 2012-05-27)</i>
<i>Redpath Museum, McGill University, Herpetological specimens</i>	<i>Redpath Museum, McGill University, Herpetological specimens. Montreal, Quebec. (accessed through GBIF portal, http://data.gbif.org/datasets/resource/8961, 2012-05-27)</i>
<i>Senckenberg, Collection Crustacea - ZMB</i>	<i>Senckenberg, Collection Crustacea - ZMB. Frankfurt, Germany. (accessed through GBIF portal, http://data.gbif.org/datasets/resource/11852, 2012-05-27)</i>
<i>Staatliches Museum fuer Naturkunde Stuttgart</i>	<i>Staatliches Museum fuer Naturkunde Stuttgart. Stuttgart, Germany. (accessed through GBIF portal, http://data.gbif.org/datasets/resource/14192, 2012-05-27)</i>
<i>University of Alberta, University of Alberta Museums, Amphibian and Reptile Collection</i>	<i>University of Alberta, University of Alberta Museums, Amphibian and Reptile Collection. Edmonton, AB. (accessed through GBIF portal, http://data.gbif.org/datasets/resource/2466, 2012-05-27)</i>
<i>Cornell University Museum of Vertebrates, Fish Collection</i>	<i>Cornell University Museum of Vertebrates, Fish Collection . Ithica, NY. (accessed through GBIF portal, http://data.gbif.org/datasets/resource/138, 2012-05-27)</i>
<i>Museum of Comparative Zoology, Harvard University, MCZ Herpetology Collection - Reptile Database</i>	<i>Museum of Comparative Zoology, Harvard University, MCZ Herpetology Collection - Reptile Database. Boston, MA. (accessed through GBIF portal, http://data.gbif.org/datasets/resource/14100, 2012-05-27)</i>
<i>Ocean Biogeographic Information System, EPA'S EMAP Database</i>	<i>Ocean Biogeographic Information System, EPA'S EMAP Database. (accessed through GBIF portal, http://data.gbif.org/datasets/resource/314, 2012-05-27)</i>
<i>Ocean Biogeographic Information System, NBI</i>	<i>Ocean Biogeographic Information System, NBI. (accessed through GBIF portal, http://data.gbif.org/datasets/resource/330, 2012-05-27)</i>
<i>Senckenberg, Collection Crustacea SMF</i>	<i>Senckenberg, Collection Crustacea SMF. Frankfurt, Germany. (accessed through GBIF portal, http://data.gbif.org/datasets/resource/8315, 2012-05-27)</i>
<i>Senckenberg, Collection Pisces SMF</i>	<i>Senckenberg, Collection Pisces SMF. Frankfurt, Germany. (accessed through GBIF portal, http://data.gbif.org/datasets/resource/8301, 2012-05-27)</i>
<i>University of Kansas Biodiversity Research Center, Fish Tissue Collection</i>	<i>University of Kansas Biodiversity Research Center, Fish Tissue Collection. Lawrence, KS. (accessed through GBIF portal, http://data.gbif.org/datasets/resource/14303, 2012-05-27)</i>

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<i>Yale University Peabody Museum, Peabody Invertebrate Zoology DiGIR Service</i>	<i>Yale University Peabody Museum, Peabody Invertebrate Zoology DiGIR Service. New Haven, CT. (accessed through GBIF portal, http://data.gbif.org/datasets/resource/1021, 2012-05-27)</i>
<i>US Fish and Wildlife Service, observations</i>	<i>USFWS Observations. US Fish and Wildlife Service.</i>