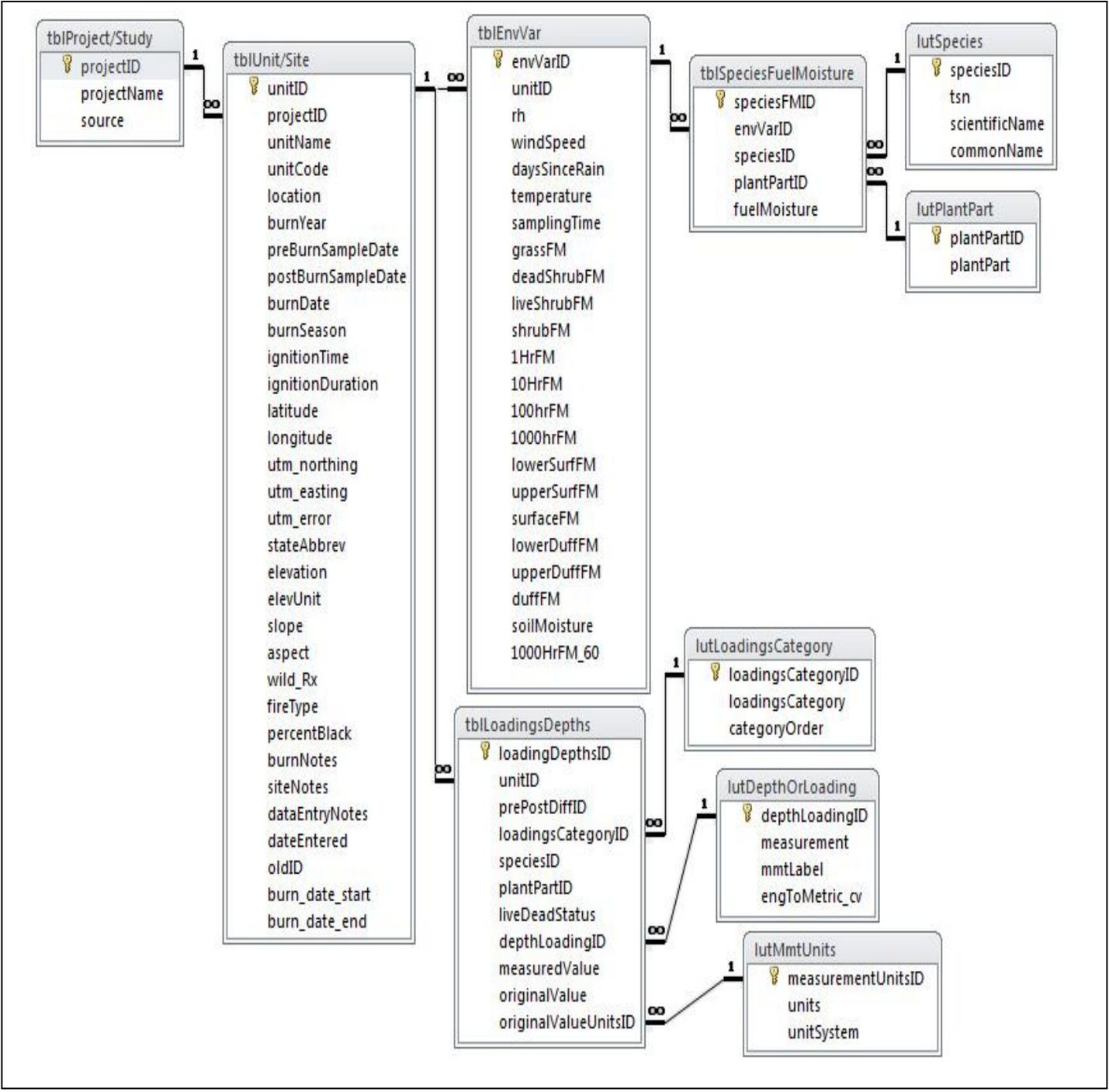


# Appendix 3: Consumption Database Documentation

The FERA fuel consumption database was created to store internal and test consumption datasets on prescribed and wildfire burns. Over the past 30 years, FERA has conducted fuel consumption research in a variety of forest and shrubland types and under a range of prescriptions from broadcast burning of clearcut harvest units to prescribed burns in ponderosa pine and southern pine forests to boreal forest floor consumption in Alaska wildfires. The main objectives of creating the FERA database were to (1) house all of our existing datasets in a single repository with common variable names and units of measure, and (2) allow for additional datasets to be added, including test data from published research.

As part of a project to expand our understanding of fuel consumption in the eastern United States (this study, JFSP 08-1-6-01), we collected fuel consumption data (including pre- and post-burn fuel characteristics and day-of-burn environmental variables) for 29 burn units in the eastern United States. This dataset expands on FERA's previous research in the southeastern United States (13 longleaf pine sites in Eglin AFB, 5 loblolly pine sites in Sumter AFB, and 31 flatwood shrub consumption sites throughout Florida). Consume 4.1 currently uses limited empirical models of woody fuel and forest floor consumption based on 18 southern pine sites. We plan to use this expanded dataset to improve our modeled fuel consumption for southern pine and mixed hardwood sites of the eastern United States. This is in partial fulfillment of JFSP project # 08-1-6-01 and is being deposited in the SEMIP and FRAMES repository and is posted on the Fire and Environmental Research Application Team's website: <http://www.fs.fed.us/pnw/fera/>. This data base is attached separately and named: JFSP\_08-1-6-01\_database.mdb.

To provide a test dataset of our revised eastern fuel consumption models, we compiled independent fuel consumption data from other studies in the eastern United States. We contacted fire and fuels experts from a range of agencies and universities in the eastern United States to locate and review potential test datasets (see main text, table 1).



### Summary of the FERA Consumption Database

Project Name	Data Source	No. Units
<b>ALASKA—</b>		
Alaska forest floor consumption study (JFSP 03-3-1-08)	FERA (Alaska wildfires study)	31
<b>EASTERN—</b>		
Midwest: Kentucky/Ohio 2009-2010 (JFSP 08-1-6-01)	FERA (Clint Wright)	5
MidWest: Kentucky/Virginia 2008-2009 (JFSP 08-1-6-01)	FERA (Clint Wright)	6
Eglin longleaf pine consumption study	FERA (Southeast pine study)	13
Flatwoods fire seasonality study (Florida 2009-2010)	Jim Cronan 2009-2010 (dormant plots)	10
Flatwoods shrub consumption	FERA (Wright 2010)	31
Florida shrub consumption 2008-2009	FERA (Clint Wright)	8
Sumter loblolly pine consumption study	FERA (Southeast pine study)	5
<b>WESTERN—</b>		
Western ponderosa pine consumption study	FERA, <b>PIPO study (Wright 2009)</b>	60
Sage shrubland consumption study	FERA (Clint Wright)	26
<b>EASTERN TEST DATASETS—</b>		
Clinton (test data)	Clinton et al. 1998	3
Kolaks (test data)	Kolaks et al. 2004	6
Loucks (test data)	Loucks 2005	10
Scholl & Waldrup (test data)	Scholl & Waldrup 2001	8
Sullivan (test data)	Sullivan et al 2003	12
Swift (test data)	Swift et al. 1993, Vose & Swank 1995	3

## References

- Clinton, B.D., Vose, J.M., Swank, W.T., Berg, E.C., and Loftis, D.L. 1998. Fuel consumption and fire characteristics during understory burning in a mixed white pine-hardwood stand in the southern Appalachians. USDA Forest Service Research Paper RP-SRS-12, Southern Research Station, Asheville, NC.
- Kolaks, J. 2004. Fuel loading and fire behavior in the Missouri Ozarks of the central hardwood region. M.S. Thesis. University of Missouri - Columbia.
- Loucks, E. 2005. The effects of landscape scale prescribed fire on fuel loading and tree health in an Appalachian hardwood forest, Kentucky. M.S. Thesis. University of Kentucky, Lexington, KY.
- Scholl, E.R. and Waldrop, T.A. 2001. Photos for estimating fuel loading before and after Prescribeding in the Upper Coastal Plain of the Southeast. USDA Forest Service General Technical Report GTR-SRS-26, Southern Research Station, Asheville, NC.
- Sullivan, B.T., Fettig, C.J., Otrosina, W.J., Dalusky, M.J., Berisford, C.W. 2003. Association between severity of Prescribeds and subsequent activity of conifer-infesting beetles in stands of longleaf pine. *Forest Ecology and Management* 185: 327-340
- Swift, L.W., Jr., Elliott, K.J, Ottmar, R.D., and Vihnanek, R.E. 1993. Site preparation burning to improve southern Appalachian pine-hardwood stands: fire characteristics and soil erosion, moisture, and temperature. *Can. J. For. Res.* 23:2242-2254.
- Vose, J. M. and W.T. Swank. 1993. Site preparation burning to improve southern Appalachian pine hardwood stands - Aboveground biomass, forest floor mass, and nitrogen and carbon pools. *Canadian Journal of Forest Research* 23(10): 2255-2262.
- Wright, C.S. and Prichard, S.J. 2006. Predicting forest floor and woody fuel consumption from prescribed burns in ponderosa pine forests. *Proceedings of the Fire Behavior and Fuels Conference*, Nov. 13-17, San Diego, CA.
- Wright, C.S. 2010. Effects of disturbance and fuelbed succession on spatial patterns of fuel, fire hazard, and carbon; and fuel consumption in shrub-dominated ecosystems. Ph.D. dissertation, University of Washington, Seattle, WA.

## Database Variable Definitions

### Project Database Table (tblProject)

Field Name	Field Type	Description
projectID	Long	Table unique recorder identifier/primary key
projectName	Text	Name of project
source	Text	Data source
unitID	Long	Table unique recorder identifier/primary key
projectID	Long	Links to tblProject.projectID
unitName	Text	
unitCode	Text	
burnYear	Long	
burnDate	Text	
burnSeason	Text	
burn_date_start	Date/Time	
burn_date_end	Date/Time	
preBurnSampleDate	Date/Time	
postBurnSampleDate	Date/Time	
ignitionTime	Long	hhmm using 24-hr clock
ignitionDuration	Text	Minutes
location	Text	Name of public land
stateAbbrev	Text	
latitude	Text	
longitude	Text	
utm_northing	Long	
utm_easting	Long	
utm_error	Long	
elevation	Long	
elevUnit	Text	
slope	Double	
aspect	Text	
wild_Rx	Text	Prescribed burn or wild fire
fireType	Text	Back, head, flank, upslope, etc.
percentBlack	Text	
burnNotes	Memo	
siteNotes	Memo	
dataEntryNotes	Memo	



### Database Table (tblUnit)

Field Name	Field Type	Description
envVarID	Long	Table unique recorder identifier/primary key
unitID	Long	Links to tblUnit.unitID
daysSinceRain	Long	Days since rain (>2.5 mm)
rh	Double	Relative humidity %
windSpeed	Double	Midflame windspeed, kph (= 1.609344 * mph)
temperature	Double	Temperature
shrubFM	Double	% Fuel moisture of shrub foliage
deadShrubFM	Double	%, Fuel moisture of dead shrub foliage
liveShrubFM	Double	%, Fuel moisture of live shrub foliage
grassFM	Double	%, Fuel moisture of grasses
1HrFM	Double	% Fuel moisture of > 1/4 inch woody fuels
10HrFM	Double	% Fuel moisture of 1/4 to 1 inch woody fuels
100hrFM	Double	% Fuel moisture of 1 to 3 inch woody fuels
1000hrFM	Double	% Fuel moisture of 3 to 9 inch woody fuels
surfaceFM	Double	Fuel moisture % of surface material (litter)
lowerSurfFM	Double	Lower surface material moisture %
upperSurfFM	Double	Upper surface material moisture %
duffFM	Double	Duff fuel moisture %
lowerDuffFM	Double	Lower duff moisture %
upperDuffFM	Double	Upper duff moisture %
soilMoisture	Double	%, Moisture content of mineral soil
samplingTime	Text	Burn initiation, mid burn, or end of burn

### Fuel Moisture Database Table (tblFuelMoisture)

Field Name	Field Type	Description
speciesFMID	Long	Table unique recorder identifier/primary key
envVarID	Long	Links to tblEnvVar.envVarID
speciesID	Long	Links to lutSpecies.speciesID
plantPartID	Long	Stem, rachis, foliage. Populated only if certain part of plant was sampled.
fuelMoisture	Double	%

## Other Tables

Table	Field Name	Field Type	Description
tblFuelMoisture	speciesFMID	Long	Table unique recorder identifier/primary key
	envVarID	Long	Links to tblEnvVar.envVarID
	speciesID	Long	Links to lutSpecies.speciesID
	plantPartID	Long	Stem, rachis, foliage. Populated only if certain part of plant was sampled.
	fuelMoisture	Double	%
tblLoadingsDepths	loadingDepthsID	Long	Table unique recorder identifier/primary key
	unitID	Long	Links to tblUnit.unitID
	prePostDiffID	Long	1 = preburn measurement, 2 = post, 3 = consumed
	loadingsCategoryID	Long	Grass, shrub, forb, 1-hr, etc. Links to lutLoadingsCategory.loadingsCategoryID
	speciesID	Long	Only if appl. Null if measurement applies to all spp. Links to lutSpecies.speciesID
	plantPartID	Long	Only if appl. Null if measurement applies to whole plant. Links to lutplantPart.plantPartID
	liveDeadStatus	Text	If appl. If null, assume live/dead together
	depthLoadingID	Long	1 = depth, 2 = loading
	measuredValue	Double	Either cm (depth) or Mg/ha (loading)
	originalValue	Double	Value before conversion to metric
	originalValueUnitsID	Long	tons/ac, lbs/ac, inches, etc. Links to lutMmtUnits.measurementUnitsID
lutDepthOrLoading	depthLoadingID	Long	Table unique recorder identifier/primary key
	measurement	Text	Depth or loading
	mmtLabel	Text	
	engToMetric_cv	Double	Multiply if eng, divide if metric
lutLoadingsCategory	loadingsCategoryID	Long	Table unique recorder identifier/primary key
	loadingsCategory	Text	Shrub, 1-HR, Surface Material, etc.
	categoryOrder	Long	
lutMmtUnits	measurementUnitsID	Long	Table unique recorder identifier/primary key
	units	Text	
	unitSystem	Long	1 = English, 2 = metric
lutPlantPart	plantPartID	Long	Table unique recorder identifier/primary key
	plantPart	Text	leaf, stem, leaf+stem, etc.
lutSpecies	speciesID	Long	Table unique recorder identifier/primary key
	tsn	Long	Taxonomic serial number from ITIS database
	scientificName	Text	
	commonName	Text	