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Integrated Science Agenda

Gulf Coastal Plains & Ozarks

Landscape Conservation Cooperative

BACKGROUND

The mission of the Gulf Coastal Plains & Ozarks Landscape Conservation Cooperative (GCPOLCC) is to define, design, and deliver landscapes capable of sustaining natural and cultural resources at desired levels now and into the future.

To achieve this mission, the GCPOLCC has adopted Strategic Habitat Conservation (SHC) as an overarching conservation framework and identified two specific roles – integrating priorities across resource perspectives and incorporating future change into current conservation planning. To serve these roles and make SHC operational in the Gulf Coastal Plains & Ozarks (GCPO) region, the Steering Committee established the Adaptation Science Management Team (ASMT).

That group met in Starkville, MS in September 2012 to outline the technical approach for meeting the GCPOLCC's mission. This document is a product of that meeting and subsequent discussions.

PURPOSE OF THIS DOCUMENT

Because the Landscape Conservation Cooperative (LCC) enterprise encompasses multiple disciplines, scales, and resource interests, many regard LCC science as a similarly broad enterprise – one that can encompass nearly any question of interest to anyone anywhere. However, to be effective, the GCPOLCC recognizes that it must focus its investments on a specific subset of science needs most relevant to achievement of its mission. Using SHC as a guiding principle, the science needs identified by the GCPOLCC through its ASMT seek to integrate science across disciplines, scales, and resources as well as the different aspects of conservation – planning, delivery, monitoring, and research. The purpose of this document is to articulate the initial subset of science needs that are the specific priorities of the GCPOLCC and the logic behind their identification. By identifying, justifying, and communicating the needs and knowledge gaps explicitly, the GCPOLCC seeks to provide a more tangible definition of the functions of the LCC to the broader conservation community (i.e., THIS is what the LCC does). In addition, the GCPOLCC seeks to share its planning framework, enable partners to see and understand how their needs fit and are met within the LCC (and how they can influence, support and/or derive benefit from a partnership with this type of science as its goal), and finally, to guide investment of its assets in accordance with the direction outlined by the Steering Committee in the GCPOLCC Strategic Plan.

GCPOLCC partners should recognize that neither conservation nor science is a linear process – by necessity and value it operates on multiple fronts simultaneously. However, this reality may also make a

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collection of research projects appear to be unrelated efforts, when in fact, there is a thread connecting them. This document seeks to outline and further elucidate that thread.

STRATEGIC HABITAT CONSERVATION FRAMEWORK

Biological Planning and Conservation Design- Initial Priorities

Most conservation is mediated through habitat management, and most habitat management decisions are place-based reflections of fairly sophisticated (though often unstated) logic about a location's current state and its ability to produce desired outcomes through management actions. Whether it is an acquisition, easement, prescription, or restoration, almost every conservation decision can be attributed to a specific action for a specific target at a specific location and a given point in time. Spatially depicting where to apply specific decisions (actions) to maximize their effectiveness on achievement of desired outcomes is the cornerstone of conservation design.

Biological planning is a necessary first step towards conservation design that establishes a common geographic and ecological frame of reference for conservation. Early on, the GCPOLCC Geomatics Working Group established 5 subgeographies that collectively comprise the Gulf Coastal Plains & Ozarks: the East Gulf Coastal Plain, the Interior Highlands, the Mississippi Alluvial Valley, the West Gulf Coastal Plain, and the Gulf Coast (Maps available at: <http://tinyurl.com/GCPOregion>). Within this geographic framework, the GCPOLCC has adopted the "Broadly Defined Habitats" developed by NatureServe and the U.S. Fish and Wildlife Service as a habitat framework (M. Pyne and C. Hunter, personal communication; Table 1; available at: <http://tinyurl.com/GCPOhabitats>). This habitat type delineation was adopted because it is broadly applicable geographically for both terrestrial and aquatic systems, has a limited subset of habitat types that are universally recognizable, and these habitat types are readily mappable to many existing classification systems.

Biological planning also entails establishment of specific and measurable outcomes. For each of the broadly defined habitat types, there are multiple outcomes or endpoints that reflect desired states for these systems. These endpoints are arranged hierarchically from broad ecological processes (e.g., disturbance interval) to landscape/stand attributes (e.g., forest patch size or stand structure) to community characteristics (e.g., abundance of open pine species) to individual species responses (e.g., gopher tortoise occurrence). **Defining desired states for each priority habitat type in terms of specific endpoints is a top priority of the GCPOLCC.** Desired states for terrestrial habitat types reflect 3 primary landscape attributes: amount, configuration, and condition. These, in turn, can be further refined:

Amount – area

Configuration (landscape) – patch size, connectivity, and other landscape metrics

Condition (stand) – structure (e.g., basal area) and composition (e.g., woody species)

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For aquatic systems, desired states reflect similar attributes:

Amount – length or area

Configuration (length) – patch size, connectivity, composition, and other landscape metrics

Condition (reach) – water quantity (e.g., flow), water quality (e.g., pH), structure (e.g., substrate)

In addition to these spatial attributes, temporal aspects of these systems are also important. For terrestrial systems (particularly forests), an appropriate distribution of successional stages is an important consideration. For aquatic systems, the timing, frequency, and rate of change are key attributes of flow. Appendix 1 contains general descriptions of these desired states for priority systems.

Moving from these general descriptions to specific, quantifiable targets for desired states (e.g., exactly how large a patch size? exactly how much flow?) requires careful consideration of the ecological limits these attributes impose on ecosystem processes, community characteristics, and individual species responses. One means of doing this is defining desired states for these systems in terms of species' limiting factors. In this case, landscape attributes and the species themselves can serve as indicators of the amount, configuration, and/or condition desired. Ideally, a suite of species - where each is limited by one of the factors defining the desired state of the system - can be identified. The process of identifying these species starts with a representative pool of species (see Appendix 2 for a list of species for each subgeography and priority habitat type derived from Species of Greatest Conservation Need identified in State Wildlife Action Plans) and identifies a subset of these species that are limited by habitat conditions reflective of desired landscape endpoints (Appendix 3). This process continues iteratively until the fewest species possible effectively "bound" the niche space for most of the desired species in the system.

Clearly documented species-habitat models that quantify relationships between indicator species and limiting factors reflecting desired states for each habitat type are needed.

As valuable as these indicators would be for guiding conservation design, they would only reflect potential wildlife conservation values for these habitat types – which is only one type of ecosystem good that is derived from the amount, configuration, and condition of terrestrial and aquatic habitat types on the landscape. Other goods include food, fuel, and fiber; other services include filtration, transportation, flood control, and recreation. Just as species serve as ecological indicators of desirable states for habitat types, these other goods and services act as indicators of desirable states for these same habitat types from an economic perspective. Similarly, aesthetics, recreation, identity, and historical record are goods and services that can offer a cultural perspective of desired states for these habitat types. **Identification of goods and services that can serve as indicators of desired economic and cultural states for each habitat type is also needed.**

If managers are expected to make informed decisions that are both ecologically beneficial and socially acceptable across multiple resources in a dynamic landscape, the ability to characterize and reconcile the full suite of goods and services that may be derived from alternative landscapes that differ with

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regards to amounts, configurations, and conditions of different habitat types is also needed.

Alternative uses of the landscape result in different amounts of habitat types in differing condition and landscape configuration. The current state of each habitat type (and the goods and services it provides) is a product of the decisions regarding past and present land use. Informed management begins with a knowledge of what currently exists; thus, **a current assessment of the amount, configuration, and condition of priority habitat types (as well as the goods and services they provide) is needed.**

Nevertheless, these systems are dynamic and will continue to change. While there is high uncertainty regarding the exact trajectory of many of these changes, effects on the landscape of these changes were they to occur are often highly predictable (if not controllable). Predicting how the landscape will look under different assumptions underlying the drivers of landscape change can inform decisions despite a high level of uncertainty. **Identifying the prominent drivers of system change for each subgeography and the specific pathways by which they are likely to “stress” the system (either positively or negatively) is needed to reduce the complexity inherent in the real world to a manageable, comprehensible, and ultimately useful subset that can be explored effectively as alternative futures.**

The ASMT began this process at its meeting in Starkville, MS (18-20 September 2012; notes available at:

<http://tinyurl.com/ASMTnotes>) by developing conceptual ecosystem models that documented the

drivers and stressors for high priority systems within each of the 5 subgeographies of the GCPOLCC

(Appendix 4). Following the meeting, these conceptual models were standardized by using the

Conservation Measures Partnership’s Taxonomy of Threats (Available at:

<http://www.conservationmeasures.org/initiatives/threats-actions-taxonomies/threats-taxonomy>).

Conversion and loss of natural systems was a primary issue in each subgeography; though, the primary driver of that loss (e.g., development, agriculture, energy production) differed among regions. Similarly, across aquatic systems, modifications to natural systems through alterations in water use and management were paramount. Again, the mechanism for this alteration (e.g., dams vs. dredging vs. irrigation) differed by subgeography.

Given ecological, economic, and cultural indicators that reflect desired states for each habitat type and a set of potential alternative futures, a manager still requires methods to objectively evaluate available options to select the best possible decision (and outcome). Numerous quantitative approaches exist to “optimize” decisions, and an entire field of multi-criteria decision analysis is dedicated to such complex problems. However, all approaches to reconcile multiple criteria require explicit knowledge of individual priorities, objectives, and preferences, as well as criteria for evaluating those preferences. Collectively, these pieces of information provide the “decision context” in which trade-offs can be realistically evaluated. **To fully take advantage of multi-criteria decision-making, there is a need to better define the contexts for a variety of decisions faced by managers.**

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SUMMARY OF SCIENCE NEED THEMATIC AREAS

1. Defining desired states for each priority habitat type in terms of specific endpoints.
2. Clearly documented species-habitat models that quantify relationships between indicator species and limiting factors reflecting desired states for each habitat type are needed.
3. Identification of goods and services that can serve as indicators of desired economic and cultural states for each habitat type is also needed.
4. The ability to characterize and reconcile the full suite of goods and services that may be derived from alternative landscapes that differ with regards to the amounts, configurations, and conditions of different habitat types is needed.
5. A current assessment of the amount, configuration, and condition of priority habitat types (as well as the goods and services they provide) is needed.
6. Identifying the prominent drivers of system change for each subgeography and the specific pathways by which they are likely to “stress” the system (either positively or negatively) is needed to reduce the complexity inherent in the real world to a manageable, comprehensible, and ultimately useful subset that can be explored effectively as alternative futures.
7. A need to better define the contexts for a variety of decisions faced by managers.

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WORKPLAN

Initially, we will pilot our efforts for a high priority terrestrial and aquatic habitat type within each subgeography. These test cases will inform the process for other habitat types that may be of lower priority and/or have less information about them.

EGCP: Grasslands

Open Pine Woodlands and Savannas

Freshwater Aquatic: Medium-low Gradient Streams and Rivers

IH: Upland Hardwoods and Montane Conifers

Freshwater Aquatic: High Gradient Streams and Rivers

MAV: Forested Wetlands

Freshwater Aquatic: Mainstem “Big” Rivers

WGCP: Open Pine Woodlands and Savannas

Grasslands

Freshwater Aquatic: Medium-low Gradient Streams and Rivers

GC: Beaches and Dunes

Estuarine: Tidal Marsh

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STEPS AND TIMELINE

ASMT Conference Call – Review Science Agenda and Work Plan	March 7
Refinements to conceptual models for priority habitats	March 15
Definition of desired states for each priority habitat	
Amount, configuration, condition	March 29
ASMT Conference Call – Review desired states; identify knowledge gaps	April 4
Draft RFP out for review	April 15
Identification of initial ecological indicators for each priority habitat	May 1
ASMT Conference Call – Review ecological indicators; Finalize RFP	May 2
RFP Posted	May 6
RFP Closes	May 27
ASMT Conference Call: Proposal Review and project selections	June 12
Assessment of terrestrial habitats – current condition	Ongoing
Assessment of aquatic habitats – current condition	Ongoing
Development of scenarios	October 1
Decision context synthesis	December 1
Prediction of habitats under alternative futures	Ongoing
Development of initial conservation strategy	March 1, 2014

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Table 1. Broadly defined habitat types within the Gulf Coastal Plains & Ozarks Landscape Conservation Cooperative region.

Beaches and Dunes

Bogs, Fens, and Seeps

Cave, Karst, and Springs

Estuarine Systems

Forested Wetlands

Freshwater Aquatic

Freshwater Transitional

Grasslands

Marine

Open Pine Woodlands and Savannas

Scrub-Shrub

Upland Hardwoods and Montane Conifers

MISSISSIPPI ALLUVIAL VALLEY

Freshwater Aquatic: Mainstem “Big River” Systems (Source: G. Constant, pers. communication)

General description of desired ecological state: Large river systems and their associated floodplains have water quality and adequate seasonal high and low flows with a frequency and duration sufficient to ensure connectedness across the diversity of habitat types

Amount: Maintain current river miles

Configuration: Maintain a diversity of habitat types and connectivity among them

Main channel

Secondary channels

Off channel deep water refugia that is seasonally persistent

Seasonally-inundated floodplains

Condition: Quality

DO – seasonally appropriate

Temperature – below critical threshold

Quantity

Adequate seasonal high and low flows with frequency and duration sufficient to ensure connectedness across habitat types and ability for priority species to meet life history requirements

MISSISSIPPI ALLUVIAL VALLEY

Forested wetlands (Source: LMVJV Forest Resource Conservation Working Group, 2007)

General description of desired ecological state: Local landscapes that are extensively forested with large contiguous patches of forest with a naturally diverse canopy containing a floristic diversity within the midstory and understory.

Amount: 3.7 M acres

Configuration: Local landscapes ($\geq 10,000$ ac) extensively (70-100%) forested

Large contiguous patches of forest

13 patches $> 100,000$ ac

36 patches $> 20,000$ ac

52 patches $> 10,000$ ac

Condition: Structure (Mature forest)

Overstory Canopy Cover: 60-70%

Midstory Cover: 25-40%

Understory Cover: 25-40%

Basal Area: 60-70 ft^2/ac

Tree Stocking: 60-70%

Large ($\geq 26''$ dbh) snags: 0.2/ac

Composition

Diverse tree species composition

Occurrence of cane and overstory vines

Water quantity

Flow patterns mimicking natural hydrology

Temporal considerations:

An appropriate distribution of successional stages, with $< 10\%$ of local landscape in early successional stage at any given time

EAST AND WEST GULF COASTAL PLAINS

Open Pine Woodland and Savanna

General description of desired ecological state: Woodlands and savannas that are floristically rich and comprised mostly of site-appropriate pine with low basal area, open canopies, and dense herbaceous understories in large interconnected blocks

Amount: 20 M acres

Configuration: Large, interconnected blocks of open pine woodland and savanna

Forest patch size: >600 ac

Connectivity: <3 km to next nearest patch

Condition: Structure (Mature)

Basal Area (pine): 40 – 70 ft²/acre

DBH: ≥20 ft²/acre of trees ≥14" dbh

Canopy Cover: <50%

Midstory Shrubs: <30% cover

Midstory Hardwoods: <20% cover

Herbaceous Understory: >65%

Temporal considerations:

An appropriate distribution of successional stages

EAST AND WEST GULF COASTAL PLAINS

Grassland-Prairie-Savanna

General description of desired ecological state: *Relatively large patches of dense, tall, and diverse native warm season grasses and forbs*

Amount: 100,000 ac

Configuration: Large patches of prairie (Source: Woodrey 1998)

5 patches >10,000 ac

500 patches >100 ac

Condition: Structure

Vegetation height (grass): 4-6'

Vegetation density: very high – nearing 100%

Bare ground: >5% but <20% (indicative of interspersions among bunch grasses)

Shrub cover: <20%

Tree density: <10/ac

Composition

Dominated by native warm season grasses and forbs

Temporal considerations:

A 5-year return interval on disturbance, with 20% of all grasslands disturbed annually

EAST AND WEST GULF COASTAL PLAINS

Freshwater Aquatic: Medium-low gradient streams and rivers

General description of desired ecological state: Medium-sized streams and rivers characterized by intact channel morphologies that support riffles and pools and a complex of physical structure (woody debris, leaf litter, and substrate types). Flows are relatively steady, with infrequent periods of low water quantity and high water temperatures.

Amount: Maintain current river miles

Configuration: Connectedness that ensures accessibility of habitats and resources within a watershed

Lateral connectedness: functional connectivity to floodplain habitats

Linear connectedness: functional connectivity of a stream network

Condition: Quality

Temperature – below critical threshold

Quantity

Adequate magnitude with limited frequency of low flows conditions

Structure

Intact channel morphologies

Natural riffle-pool sequences

Meandering channels with natural sinuosity

High physical structure complexity

High amounts of small woody debris

Adequate amounts of large woody debris

Diversity of substrates, including numerous gravel beds and sandbars

OZARK HIGHLANDS

Upland Hardwoods

General description of desired ecological state: Large blocks of oak forest and woodland in appropriately distributed successional stages in predominantly forested landscapes. Woodlands are characterized by moderate canopy cover and tree densities that allow ample light to reach the ground, supporting a variety of grasses and forbs. Forests are characterized by nearly closed overstory canopy with well-developed subcanopy, shrub, and understory strata comprised of shade-tolerant species.

Amount: 1.9 M acres of woodland; 0.7 M acres of forest

Configuration: Large blocks of oak forest and woodland in predominantly forested landscapes

Forest patch size: ≥5000 ac of interdigitated forest habitat types

Landscape composition (woodland and forest in 10-km radius): >70%

Adequate connectivity

Condition: Structure

Canopy cover: 20 – 80% for woodlands

>80% for forests

Average DBH: ≥14" dbh

Tree density: ~40 trees/ac for woodlands

~80 trees/ac for forests

Snag density: 1 large (≥16" dbh) snag/5 ac

Dead/downed wood: 1 6' log (≥8" dbh)/ac

Midstory density: ≤20%

Composition

Oak and hickory basal area: >90% for woodlands

>70% for forests

Temporal considerations: An appropriate distribution of successional stages; ≤10% of the landscape

Fire return interval: 3 years for woodlands; 10 years for forest

OZARK HIGHLANDS

Freshwater Aquatic: High gradient streams and rivers

General description of desired ecological state: Small springs, runs, and headwaters characterized by clear, clean, and relatively cold water in largely undisturbed forest settings.

Amount: Maintain current river miles

Configuration: Landscape context: watersheds should be >75% forested, with <10% impervious cover
Intact riparian corridors consisting primarily of hardwoods within 30 m buffer of stream
Interconnected stream systems

Condition: Water Quality

High water quality – minimal contaminants and nutrients

Temperatures – low

DO – high

Sediment – minimal

Water Quantity

Natural flow regimes maintained

Groundwater flow regime: low flow variability, low peak flows, low frequency of low flows

Runoff Flow regime: moderate flow variability, moderate peak flows, moderate frequency of low flows

Intermittent flow regime: high flow variability, high peak flows, high frequency of low flows

Structure

Abundant leaf litter

Variety of substrates – gravel to boulders

Appendix 1. Desired Ecological States for Priority Systems of the GCPOLCC

GULF COAST

Beaches and Dunes

General description of desired ecological state: *Stable, vegetated dune systems (including primary and secondary dunes) along intact, wide beaches with limited human disturbance.*

Amount: 138,500 ac

Configuration: Functional connectivity of beach and dune systems

Disturbance: No unfettered access to dunes

Condition: Structure

Presence of primary, secondary, and tertiary dunes, where appropriate

Vegetative cover: 20-50%

Dune width: 10-20'

Dune Height: Primary: 2'-4'

Secondary: 4'-6'

Tertiary: >6'

Dune Slope: 18-45 degrees

Composition

Presence of sea oats, bitter panicum, and *Spartina patens*

GULF COAST

Tidal Marsh

General description of desired ecological state: Stable marsh systems comprised of native vegetation and limited open water conditions occurring in large blocks with natural hydrology present.

Amount: Adequate acres to meet needs of tidal wetland wildlife at desired levels; no loss

Configuration: Large blocks of unbroken marsh (>250 ac)

Connectivity of habitat types reflective of interdigitation of marsh types

Moderate amounts of edge within large blocks of marsh

Presence of barrier island in riverine-dominated systems

Condition: Structure

Emergent vegetative cover: >70%

Limited open water: <20%

Submergent vegetative cover: 15-30%

Composition

Dominated by native plants typical of high, mid-, intermediate, and low marsh

Water quality

Salinity – aligned along natural gradient

Water quantity

Adequate freshwater flows and tidal influence

Appendix 2. Representative Species Pool for Priority Systems of the GCPOLCC

MISSISSIPPI ALLUVIAL VALLEY

Freshwater Aquatic: Mainstem “Big River” Systems

Scientific Name	Common Name	Taxon	Big Rivers
<i>Necturus maculosus maculosus</i>	Common Mudpuppy	Amphibians	X
<i>Actinonaias ligamentina</i>	Mucket	Bivalves	X
<i>Amblema plicata</i>	Threeridge Mussel	Bivalves	X
<i>Anodonta suborbiculata</i>	Flat Floater	Bivalves	X
<i>Arcidens confragosus</i>	Rock Pocketbook	Bivalves	X
<i>Ellipsaria lineolata</i>	Butterfly	Bivalves	X
<i>Elliptio crassidens</i>	Elephant-ear	Bivalves	X
<i>Fusconaia ebena</i>	Ebonysell	Bivalves	X
<i>Glebulula rotundata</i>	Round Pearlshell	Bivalves	X
<i>Lampsilis siliquoides</i>	Fatmucket	Bivalves	X
<i>Lampsilis teres</i>	Yellow Sandshell	Bivalves	X
<i>Megalonaias nervosa</i>	Washboard	Bivalves	X
<i>Plectomerus dombeyanus</i>	Bankclimber	Bivalves	X
<i>Pleurobema rubrum</i>	Pyramid Pigtoe	Bivalves	X
<i>Potamilus capax</i>	Fat Pocketbook	Bivalves	X
<i>Potamilus purpuratus</i>	Bleufer	Bivalves	X
<i>Quadrula nodulata</i>	Wartyback	Bivalves	X
<i>Toxolasma texensis</i>	Texas Lilliput	Bivalves	X
<i>Truncilla donaciformis</i>	Fawnsfoot	Bivalves	X
<i>Truncilla truncata</i>	Deertoe	Bivalves	X
<i>Unio declivis</i>	Tapered Pondhorn	Bivalves	X
<i>Cumberlandia monodonta</i>	Spectaclecase	Bivalves	X
<i>Cyclonaias tuberculata</i>	Purple Wartyback	Bivalves	X
<i>Fusconaia flava</i>	Wabash pigtoe	Bivalves	X
<i>Lampsilis abrupta</i>	Pink Mucket	Bivalves	X
<i>Lampsilis cardium</i>	Plain Pocketbook	Bivalves	X
<i>Lampsilis hyalina</i>	Louisiana Fatmucket	Bivalves	X
<i>Leptodea leptodon</i>	Scaleshell	Bivalves	X
<i>Ligumia recta</i>	Black Sandshell	Bivalves	X
<i>Quadrula apiculata</i>	Southern Mapleleaf	Bivalves	X
<i>Quadrula cylindrica</i>	Rabbitsfoot	Bivalves	X
<i>Unio tetralasmus</i>	Pondhorn	Bivalves	X
<i>Acipenser fulvescens</i>	Lake Sturgeon	Fish	X
<i>Ameiurus nebulosus</i>	Brown Bullhead	Fish	X
<i>Anguilla rostrata</i>	American Eel	Fish	X
<i>Atractosteus spatula</i>	Alligator Gar	Fish	X
<i>Carpodacus velifer</i>	Highfin Carpsucker	Fish	X
<i>Centrarchus macropterus</i>	Flier	Fish	X
<i>Cycleptus elongatus</i>	Blue Sucker	Fish	X
<i>Esox niger</i>	Chain Pickerel	Fish	X
<i>Hiodon alosoides</i>	Goldeye	Fish	X
<i>Hiodon tergisus</i>	Mooneye	Fish	X
<i>Hybognathus hayi</i>	Cypress Minnow	Fish	X
<i>Hybognathus nuchalis</i>	Mississippi Silvery Minnow	Fish	X
<i>Ichthyomyzon castaneus</i>	Chestnut Lamprey	Fish	X
<i>Ictalurus furcatus</i>	Blue Catfish	Fish	X
<i>Ictalurus punctatus</i>	Channel Catfish	Fish	X

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Appendix 2. Representative Species Pool for Priority Systems of the GCPOLCC

<i>Ictiobus niger</i>	Black Buffalo	Fish	X
<i>Lepisosteus platostomus</i>	Shortnose Gar	Fish	X
<i>Lepomis symmetricus</i>	Bantam Sunfish	Fish	X
<i>Menidia beryllina</i>	Inland Silverside	Fish	X
<i>Notropis buchanani</i>	Ghost Shiner	Fish	X
<i>Notropis texanus</i>	Weed Shiner	Fish	X
<i>Pylodictis olivaris</i>	Flathead Catfish	Fish	X
<i>Polyodon spathula</i>	Paddlefish	Fish	X
<i>Scaphirhynchus albus</i>	Pallid Sturgeon	Fish	X
<i>Macrochelys temminckii</i>	Alligator Snapping Turtle	Reptiles	X

Appendix 2. Representative Species Pool for Priority Systems of the GCPOLCC

MISSISSIPPI ALLUVIAL VALLEY

Forested wetlands

Scientific Name	Common Name	Taxon	Forested Wetlands
<i>Acris gryllus</i>	Southern Cricket Frog	Amphibians	X
<i>Amphiuma tridactylum</i>	Three-toed Amphiuma	Amphibians	X
<i>Desmognathus auriculatus</i>	Southern Dusky Salamander	Amphibians	X
<i>Desmognathus conanti</i>	Spotted Dusky Salamander	Amphibians	X
<i>Eurycea guttolineata</i>	Three-lined Salamander	Amphibians	X
<i>Hyla avivoca</i>	Bird-voiced Treefrog	Amphibians	X
<i>Hyla cinerea</i>	Green Treefrog	Amphibians	X
<i>Hyla versicolor</i>	Gray Treefrog	Amphibians	X
<i>Rana grylio</i>	Pig Frog	Amphibians	X
<i>Siren intermedia nettingi</i>	Western Lesser Siren	Amphibians	X
<i>Aix sponsa</i>	Wood Duck	Birds	X
<i>Anas platyrhynchos</i>	Mallard	Birds	X
<i>Anhinga anhinga</i>	Anhinga	Birds	X
<i>Ardea alba</i>	Great Egret	Birds	X
<i>Buteo lineatus</i>	Red-shouldered Hawk	Birds	X
<i>Buteo platypterus platypterus</i>	Broad-winged Hawk	Birds	X
<i>Campephilus principalis</i>	Ivory-billed Woodpecker	Birds	X
<i>Coccyzus americanus</i>	Yellow-billed Cuckoo	Birds	X
<i>Colaptes auratus auratus</i>	Northern Flicker	Birds	X
<i>Contopus virens</i>	Eastern Wood-pewee	Birds	X
<i>Dendroica cerulea</i>	Cerulean Warbler	Birds	X
<i>Dendroica dominica</i>	Yellow-throated Warbler	Birds	X
<i>Dryocopus pileatus</i>	Pileated Woodpecker	Birds	X
<i>Egretta caerulea</i>	Little Blue Heron	Birds	X
<i>Egretta thula</i>	Snowy Egret	Birds	X
<i>Elanoides forficatus</i>	Swallow-tailed Kite	Birds	X
<i>Empidonax virescens</i>	Acadian Flycatcher	Birds	X
<i>Haliaeetus leucocephalus</i>	Bald Eagle	Birds	X
<i>Hylocichla mustelina</i>	Wood Thrush	Birds	X
<i>Limnothlypis swainsonii</i>	Swainson's Warbler	Birds	X
<i>Lophodytes cucullatus</i>	Hooded Merganser	Birds	X
<i>Melanerpes erythrocephalus</i>	Red-headed Woodpecker	Birds	X
<i>Meleagris gallopavo</i>	Wild Turkey	Birds	X
<i>Myiarchus crinitus</i>	Great Crested Flycatcher	Birds	X
<i>Nycticorax nycticorax</i>	Black-crowned Night-heron	Birds	X
<i>Nycticorax violaceus</i>	Yellow-crowned Night-heron	Birds	X
<i>Oporornis formosus</i>	Kentucky Warbler	Birds	X
<i>Parula americana</i>	Northern Parula	Birds	X
<i>Protonotaria citrea</i>	Prothonotary Warbler	Birds	X
<i>Vireo flavifrons</i>	Yellow-throated Vireo	Birds	X
<i>Vireo gilvus</i>	Warbling Vireo	Birds	X
<i>Vireo griseus</i>	White-eyed Vireo	Birds	X
<i>Wilsonia citrina</i>	Hooded Warbler	Birds	X
<i>Corynorhinus rafinesquii</i>	Rafinesque's Big-eared Bat	Mammals	X
<i>Lasiurus borealis</i>	Eastern Red Bat	Mammals	X
<i>Lasiurus seminolus</i>	Seminole Bat	Mammals	X
<i>Lontra canadensis</i>	River Otter	Mammals	X

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<i>Myotis austroriparius</i>	Southeastern Myotis	Mammals	X
<i>Neovison vison</i>	Common Mink	Mammals	X
<i>Ochrotomys nuttalli</i>	Golden Mouse	Mammals	X
<i>Odocoileus virginianus</i>	White-tailed Deer	Mammals	X
<i>Sciurus carolinensis</i>	Gray Squirrel	Mammals	X
<i>Sciurus niger</i>	Fox Squirrel	Mammals	X
<i>Sylvilagus aquaticus</i>	Swamp Rabbit	Mammals	X
<i>Ursus americanus</i>	Black Bear	Mammals	X
<i>Agkistrodon contortrix</i>	Copperhead	Reptiles	X
<i>Agkistrodon piscivorus leucostoma</i>	Western Cottonmouth	Reptiles	X
<i>Alligator mississippiensis</i>	American Alligator	Reptiles	X
<i>Farancia abacura reinwardtii</i>	Western Mudsnake	Reptiles	X
<i>Kinosternon subrubrum</i>	Eastern Mud Turtle	Reptiles	X
<i>Nerodia cyclopion</i>	Green Water Snake	Reptiles	X
<i>Nerodia erythrogaster</i>	Yellowbelly Water Snake	Reptiles	X
<i>Nerodia fasciata</i>	Broad-banded Water Snake	Reptiles	X
<i>Terrapene carolina</i>	Eastern Box Turtle	Reptiles	X

Appendix 2. Representative Species Pool for Priority Systems of the GCPOLCC

EAST AND WEST GULF COASTAL PLAINS

Open Pine Woodland and Savanna

Scientific Name	Common Name	Taxon	Pine
<i>Ambystoma bishopi</i>	Flatwoods Salamander	Amphibians	x
<i>Ambystoma talpoideum</i>	Mole Salamander	Amphibians	x
<i>Ambystoma tigrinum</i>	Tiger Salamander	Amphibians	x
<i>Bufo quercicus</i>	Oak Toad	Amphibians	x
<i>Eurycea cf. quadridigitata</i>	Bog Dwarf Salamander	Amphibians	x
<i>Eurycea quadridigitata</i>	Dwarf Salamander	Amphibians	x
<i>Hyla andersonii</i>	Pine Barrens Treefrog	Amphibians	x
<i>Rana areolata areolata</i>	Southern Crawfish Frog	Amphibians	x
<i>Rana capito</i>	Gopher Frog	Amphibians	x
<i>Rana sevosa</i>	Mississippi Gopher Frog	Amphibians	x
<i>Aimophila aestivalis</i>	Bachman's Sparrow	Birds	x
<i>Ammodramus henslowii</i>	Henslow's Sparrow	Birds	x
<i>Caprimulgus carolinensis</i>	Chuck-will's-widow	Birds	x
<i>Caprimulgus vociferus</i>	Whip-poor-will	Birds	x
<i>Coccyzus americanus</i>	Yellow-billed Cuckoo	Birds	x
<i>Colinus virginianus</i>	Northern Bobwhite	Birds	x
<i>Dendroica discolor</i>	Prairie Warbler	Birds	x
<i>Dendroica dominica</i>	Yellow-throated Warbler	Birds	x
<i>Dendroica pinus</i>	Pine Warbler	Birds	x
<i>Dryocopus pileatus</i>	Pileated Woodpecker	Birds	x
<i>Falco sparverius paulus</i>	Southeastern American Kestrel	Birds	x
<i>Geococcyx californianus</i>	Greater Roadrunner	Birds	x
<i>Grus canadensis pulla</i>	Mississippi Sandhill Crane	Birds	x
<i>Melanerpes erythrocephalus</i>	Red-headed Woodpecker	Birds	x
<i>Meleagris gallopavo</i>	Wild Turkey	Birds	x
<i>Picoides borealis</i>	Red-cockaded Woodpecker	Birds	x
<i>Picoides villosus</i>	Hairy Woodpecker	Birds	x
<i>Pipilo erythrophthalmus</i>	Eastern Towhee	Birds	x
<i>Sitta pusilla</i>	Brown-headed Nuthatch	Birds	x
<i>Geomys pinetis</i>	Southeastern Pocket Gopher	Mammals	x
<i>Sciurus niger niger</i>	Southeastern Fox Squirrel	Mammals	x
<i>Cemophora coccinea</i>	Scarlet Snake	Reptiles	x
<i>Crotalus adamanteus</i>	Eastern Diamondback Rattlesnake	Reptiles	x
<i>Drymarchon couperi</i>	Eastern Indigo Snake	Reptiles	x
<i>Gopherus polyphemus</i>	Gopher Tortoise	Reptiles	x
<i>Lampropeltis getula</i>	Common Kingsnake	Reptiles	x
<i>Masticophis flagellum</i>	Eastern Coachwhip	Reptiles	x
<i>Micrurus fulvius</i>	Coral Snake	Reptiles	x
<i>Micrurus tener tener</i>	Texas Coral Snake	Reptiles	x
<i>Pituophis melanoleucus</i>	Northern Pine Snake	Reptiles	x
<i>Pituophis ruthveni</i>	Louisiana Pine Snake	Reptiles	x
<i>Sistrurus miliarius</i>	Pygmy Rattlesnake	Reptiles	x
<i>Tantilla coronata</i>	Southeastern Crowned Snake	Reptiles	x

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EAST AND WEST GULF COASTAL PLAINS

Grassland-Prairie-Savanna

Scientific Name	Common Name	Taxon	Grassland
<i>Ambystoma tigrinum</i>	Tiger Salamander	Amphibians	X
<i>Gastrophryne olivacea</i>	Great Plains Narrowmouth Toad	Amphibians	X
<i>Pseudacris ornata</i>	Ornate Chorus Frog	Amphibians	X
<i>Rana areolata areolata</i>	Southern Crawfish Frog	Amphibians	X
<i>Spea bombifrons</i>	Plains Spadefoot	Amphibians	X
<i>Ammodramus leconteii</i>	LeConte's Sparrow	Birds	X
<i>Ammodramus savannarum</i>	Grasshopper Sparrow	Birds	X
<i>Chondestes grammacus</i>	Lark Sparrow	Birds	X
<i>Colinus virginianus</i>	Northern Bobwhite	Birds	X
<i>Lanius ludovicianus</i>	Loggerhead Shrike	Birds	X
<i>Passerina ciris</i>	Painted Bunting	Birds	X
<i>Scolopax minor</i>	American Woodcock	Birds	X
<i>Spiza americana</i>	Dickcissel	Birds	X
<i>Spizella pusilla</i>	Field Sparrow	Birds	X
<i>Sturnella magna</i>	Eastern Meadowlark	Birds	X
<i>Thryomanes bewickii</i>	Bewick's Wren	Birds	X
<i>Tyrannus forficatus</i>	Scissor-tailed Flycatcher	Birds	X
<i>Tyrannus tyrannus</i>	Eastern Kingbird	Birds	X
<i>Tyto alba</i>	Common Barn-owl	Birds	X
<i>Vireo bellii</i>	Bell's Vireo	Birds	X
<i>Zenaida macroura</i>	Mourning Dove	Birds	X
<i>Checkerspot butterflies</i>	Euphydryas spp.	Insect	X
<i>Blarina carolinensis</i>	Southern Short-tailed Shrew	Mammals	X
<i>Chaetodipus hispidus</i>	Hispid Pocket Mouse	Mammals	X
<i>Geomys pinetis</i>	Southeastern Pocket Gopher	Mammals	X
<i>Mephitis mephitis</i>	Striped Skunk	Mammals	X
<i>Oryzomys palustris</i>	Rice Rat	Mammals	X
<i>Peromyscus gossypinus</i>	Cotton Mouse	Mammals	X
<i>Peromyscus polionotus</i>	Oldfield Mouse	Mammals	X
<i>Reithrodontomys humulis</i>	Eastern Harvest Mouse	Mammals	X
<i>Sorex longirostris</i>	Southeastern Shrew	Mammals	X
<i>Spilogale putorius</i>	Eastern Spotted Skunk	Mammals	X
<i>Sylvilagus floridanus</i>	Eastern Cottontail Rabbit	Mammals	X
<i>Carphophis amoenus helenae</i>	Midwest Worm Snake	Reptiles	X
<i>Carphophis vermis</i>	Western Worm Snake	Reptiles	X
<i>Cnemidophorus sexlineatus</i>	Six-lined Racerunner	Reptiles	X
<i>Elaphe guttata guttata</i>	Corn Snake	Reptiles	X
<i>Eumeces obsoletus</i>	Great Plains Skink	Reptiles	X
<i>Eumeces septentrionalis</i>	Prairie Skink	Reptiles	X
<i>Lampropeltis calligaster</i>	Mole Kingsnake	Reptiles	X
<i>Lampropeltis getula</i>	Common Kingsnake	Reptiles	X
<i>Masticophis flagellum</i>	Eastern Coachwhip	Reptiles	X
<i>Ophisaurus attenuatus</i>	Slender Glass Lizard	Reptiles	X
<i>Ophisaurus ventralis</i>	Eastern Glass Lizard	Reptiles	X
<i>Phrynosoma cornutum</i>	Texas Horned Lizard	Reptiles	X
<i>Sistrurus miliarius</i>	Pygmy Rattlesnake	Reptiles	X
<i>Terrapene ornata ornata</i>	Ornate Box Turtle	Reptiles	X

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EAST AND WEST GULF COASTAL PLAINS

Freshwater Aquatic: Medium-low gradient streams and rivers

Scientific Name	Common Name	Taxon	Stream
<i>Desmognathus apalachicola</i>	Apalachicola Dusky Salamander	Amphibians	X
<i>Desmognathus auriculatus</i>	Southern Dusky Salamander	Amphibians	X
<i>Desmognathus cf. conanti</i>	Eglin Ravine Dusky Salamander	Amphibians	X
<i>Desmognathus conanti</i>	Spotted Dusky Salamander	Amphibians	X
<i>Eurycea guttolineata</i>	Three-lined Salamander	Amphibians	X
<i>Necturus beyeri</i>	Gulf Coast Waterdog	Amphibians	X
<i>Necturus maculosus louisianensis</i>	Red River Mudpuppy	Amphibians	X
<i>Necturus maculosus maculosus</i>	Common Mudpuppy	Amphibians	X
<i>Plethodon kiamichi</i>	Kiamichi Slimy Salamander	Amphibians	X
<i>Plethodon kisatchie</i>	Louisiana Slimy Salamander	Amphibians	X
<i>Plethodon sequoyah</i>	Sequoyah Slimy Salamander	Amphibians	X
<i>Pseudotriton montanus</i>	Mud Salamander	Amphibians	X
<i>Pseudotriton ruber</i>	Red Salamander	Amphibians	X
<i>Actinonaias ligamentina</i>	Mucket	Bivalves	X
<i>Amblema plicata</i>	Threeridge Mussel	Bivalves	X
<i>Arcidens confragosus</i>	Rock Pocketbook	Bivalves	X
<i>Cyclonaias tuberculata</i>	Purple Wartyback	Bivalves	X
<i>Ellipsaria lineolata</i>	Butterfly	Bivalves	X
<i>Fusconaia flava</i>	Wabash pigtoe	Bivalves	X
<i>Glebulia rotundata</i>	Round Pearlshell	Bivalves	X
<i>Lampsilis abrupta</i>	Pink Mucket	Bivalves	X
<i>Lampsilis hydiana</i>	Louisiana Fatmucket	Bivalves	X
<i>Lampsilis ornata</i>	Southern Pocketbook	Bivalves	X
<i>Lampsilis siliquoidea</i>	Fatmucket	Bivalves	X
<i>Lampsilis teres</i>	Yellow Sandshell	Bivalves	X
<i>Ligumia recta</i>	Black Sandshell	Bivalves	X
<i>Megalonaias nervosa</i>	Washboard	Bivalves	X
<i>Obovaria jacksoniana</i>	Southern Hickorynut	Bivalves	X
<i>Potamilus alatus</i>	Pink Heelsplitter	Bivalves	X
<i>Quadrula apiculata</i>	Southern Mapleleaf	Bivalves	X
<i>Quadrula cylindrica</i>	Rabbitsfoot	Bivalves	X
<i>Strophitus subvexus</i>	Southern Creekmussel	Bivalves	X
<i>Truncilla donaciformis</i>	Fawnsfoot	Bivalves	X
<i>Truncilla truncata</i>	Deertoe	Bivalves	X
<i>Uniomerus declivis</i>	Tapered Pondhorn	Bivalves	X
<i>Villosa lienosa</i>	Little Spectaclecase	Bivalves	X
<i>Anodontoides radiatus</i>	Rayed Creekshell	Bivalves	X
<i>Cyprogenia stegaria</i>	Fanshell	Bivalves	X
<i>Elliptio arca</i>	Alabama Spike	Bivalves	X
<i>Elliptio arctata</i>	Delicate Spike	Bivalves	X
<i>Elliptio crassidens</i>	Elephant-ear	Bivalves	X
<i>Epioblasma penita</i>	Southern Combshell	Bivalves	X
<i>Fusconaia burkei</i>	Tapered Pigtoe	Bivalves	X
<i>Fusconaia escambia</i>	Narrow Pigtoe	Bivalves	X
<i>Fusconaia rotulata</i>	Round Ebonyshell	Bivalves	X
<i>Hamiota altilis</i>	Finelined Pocketbook	Bivalves	X
<i>Hamiota australis</i>	Southern Sandshell	Bivalves	X

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<i>Hamiota perovalis</i>	Orangenacre Mucket	Bivalves	X
<i>Lampsilis straminea straminea</i>	Rough Fatmucket	Bivalves	X
<i>Lasmigona alabamensis</i>	Alabama Heelsplitter	Bivalves	X
<i>Medionidus acutissimus</i>	Alabama Moccasinshell	Bivalves	X
<i>Obovaria unicolor</i>	Alabama Hickorynut	Bivalves	X
<i>Pleurobema curtum</i>	Black Clubshell	Bivalves	X
<i>Pleurobema decisum</i>	Southern Clubshell	Bivalves	X
<i>Pleurobema perovatum</i>	Ovate Clubshell	Bivalves	X
<i>Pleurobema strodeanum</i>	Fuzzy Pigtoe	Bivalves	X
<i>Pleurobema taitianum</i>	Heavy Pigtoe	Bivalves	X
<i>Pleurobema troschelium</i>	Alabama Clubshell	Bivalves	X
<i>Pleurobema dolabelloides</i>	Slabside Pearlymussel	Bivalves	X
<i>Ptychobranhus greenii</i>	Triangular Kidneyshell	Bivalves	X
<i>Ptychobranhus jonesi</i>	Southern Kidneyshell	Bivalves	X
<i>Quadrula rumphiana</i>	Ridged Mapleleaf	Bivalves	X
<i>Quadrula stapes</i>	Stirrupshell	Bivalves	X
<i>Strophitus connasaugaensis</i>	Alabama Creekmussel	Bivalves	X
<i>Toxolasma corvunculus</i>	Southern Purple Lilliput	Bivalves	X
<i>Utterbackia peggyae</i>	Florida Floater	Bivalves	X
<i>Villosa choctawensis</i>	Choctaw Bean	Bivalves	X
<i>Villosa iris</i>	Rainbow	Bivalves	X
<i>Villosa vibex</i>	Southern Rainbow	Bivalves	X
<i>Arkansia wheeleri</i>	Ouachita Rock Pocketbook	Bivalves	X
<i>Cyprogenia aberti</i>	Western Fanshell	Bivalves	X
<i>Elliptio dilatata</i>	Spike	Bivalves	X
<i>Fusconaia lananensis</i>	Triangle Pigtoe	Bivalves	X
<i>Lampsilis cardium</i>	Plain Pocketbook	Bivalves	X
<i>Lampsilis powellii</i>	Arkansas Fatmucket	Bivalves	X
<i>Lampsilis rafinesqueana</i>	Neosho Mucket	Bivalves	X
<i>Lampsilis satura</i>	Sandbank Pocketbook	Bivalves	X
<i>Lampsilis streckeri</i>	Speckled Pocketbook	Bivalves	X
<i>Leptodea leptodon</i>	Scaleshell	Bivalves	X
<i>Margaritifera hembeli</i>	Louisiana Pearlshell	Bivalves	X
<i>Pleurobema riddellii</i>	Louisiana Pigtoe	Bivalves	X
<i>Pleurobema sintoxia</i>	Round Pigtoe	Bivalves	X
<i>Potamilus amphichaenus</i>	Texas Heelsplitter	Bivalves	X
<i>Ptychobranhus occidentalis</i>	Ouachita Kidneyshell	Bivalves	X
<i>Quadrula metanevra</i>	Monkeyface	Bivalves	X
<i>Quadrula nodulata</i>	Wartyback	Bivalves	X
<i>Strophitus undulatus</i>	Creeping	Bivalves	X
<i>Toxolasma texasensis</i>	Texas Lilliput	Bivalves	X
<i>Alosa alabamiae</i>	Alabama Shad	Fish	X
<i>Ambloplites rupestris</i>	Rock Bass	Fish	X
<i>Ammocrypta beani</i>	Naked Sand Darter	Fish	X
<i>Ammocrypta clara</i>	Western Sand Darter	Fish	X
<i>Ammocrypta meridiana</i>	Southern Sand Darter	Fish	X
<i>Ammocrypta vivax</i>	Scaly Sand Darter	Fish	X
<i>Camptostoma anomalum</i>	Central Stoneroller	Fish	X
<i>Clinostomus funduloides</i>	Rosyside Dace	Fish	X
<i>Cottus caroliniae</i>	Banded Sculpin	Fish	X
<i>Cottus paulus</i>	Pygmy Sculpin	Fish	X
<i>Crystallaria asprella</i>	Crystal Darter	Fish	X

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<i>Cycleptus meridionalis</i>	Southeastern Blue Sucker	Fish	X
<i>Cyprinella camura</i>	Bluntnose Shiner	Fish	X
<i>Cyprinella galactura</i>	Whitetail Shiner	Fish	X
<i>Cyprinella spiloptera</i>	Spotfin Shiner	Fish	X
<i>Cyprinella venusta</i>	Blacktail Shiner	Fish	X
<i>Cyprinella whipplei</i>	Steelcolor Shiner	Fish	X
<i>Dionda argentosa</i>	Manantial Roundnose Minnow	Fish	X
<i>Erimonax monachus</i>	Spotfin Chub	Fish	X
<i>Erimyzon oblongus</i>	Creek Chubsucker	Fish	X
<i>Erimyzon sucetta</i>	Lake Chubsucker	Fish	X
<i>Etheostoma asprigene</i>	Mud Darter	Fish	X
<i>Etheostoma blennioides</i>	Greenside Darter	Fish	X
<i>Etheostoma caeruleum</i>	Rainbow Darter	Fish	X
<i>Etheostoma cervus</i>	Chickasaw Darter	Fish	X
<i>Etheostoma chienense</i>	Relict Darter	Fish	X
<i>Etheostoma collettei</i>	Creole Darter	Fish	X
<i>Etheostoma duryi</i>	Black Darter	Fish	X
<i>Etheostoma flabellare</i>	Fantail Darter	Fish	X
<i>Etheostoma fusiforme</i>	Swamp Darter	Fish	X
<i>Etheostoma histrio</i>	Harlequin Darter	Fish	X
<i>Etheostoma kennicotti</i>	Stripetail Darter	Fish	X
<i>Etheostoma lachneri</i>	Tombigbee Darter	Fish	X
<i>Etheostoma lynceum</i>	Brighteye Darter	Fish	X
<i>Etheostoma nigripinne</i>	Blackfin Darter	Fish	X
<i>Etheostoma nuchale</i>	Watercress Darter	Fish	X
<i>Etheostoma pallididorsum</i>	Paleback Darter	Fish	X
<i>Etheostoma parvipinne</i>	Goldstripe Darter	Fish	X
<i>Etheostoma proeliare</i>	Cypress Darter	Fish	X
<i>Etheostoma pyrrhogaster</i>	Firebelly Darter	Fish	X
<i>Etheostoma radiosum</i>	Orangebelly Darter	Fish	X
<i>Etheostoma raneyi</i>	Yazoo Darter	Fish	X
<i>Etheostoma rubrum</i>	Bayou Darter	Fish	X
<i>Etheostoma rupestre</i>	Rock Darter	Fish	X
<i>Etheostoma stigmaeum</i>	Speckled Darter	Fish	X
<i>Etheostoma swaini</i>	Gulf Darter	Fish	X
<i>Etheostoma whipplei</i>	Redfin Darter	Fish	X
<i>Etheostoma zonifer</i>	Backwater Darter	Fish	X
<i>Etheostoma zonistium</i>	Bandfin Darter	Fish	X
<i>Hybognathus nuchalis</i>	Mississippi Silvery Minnow	Fish	X
<i>Hybopsis amnis</i>	Pallid Shiner	Fish	X
<i>Ichthyomyzon gagei</i>	Southern Brook Lamprey	Fish	X
<i>Ictiobus niger</i>	Black Buffalo	Fish	X
<i>Lampetra aepyptera</i>	Least Brook Lamprey	Fish	X
<i>Lampetra appendix</i>	American Brook Lamprey	Fish	X
<i>Lepisosteus platostomus</i>	Shortnose Gar	Fish	X
<i>Lepomis marginatus</i>	Dollar Sunfish	Fish	X
<i>Lythrurus fasciolaris</i>	Rosefin Shiner	Fish	X
<i>Lythrurus snelsoni</i>	Ouachita Shiner	Fish	X
<i>Macrhybopsis aestivalis</i>	Speckled Chub	Fish	X
<i>Macrhybopsis hyostoma</i>	Shoal Chub	Fish	X
<i>Macrhybopsis storeriana</i>	Silver Chub	Fish	X
<i>Moxostoma carinatum</i>	River Redhorse	Fish	X

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<i>Moxostoma duquesnei</i>	Black Redhorse	Fish	X
<i>Moxostoma erythrurum</i>	Golden Redhorse	Fish	X
<i>Moxostoma poecilurum</i>	Blacktail Redhorse	Fish	X
<i>Notropis asperifrons</i>	Burrhead Shiner	Fish	X
<i>Notropis atrocaudalis</i>	Blackspot Shiner	Fish	X
<i>Notropis bairdi</i>	Red River Shiner	Fish	X
<i>Notropis boops</i>	Bigeye Shiner	Fish	X
<i>Notropis buccatus</i>	Silverjaw Minnow	Fish	X
<i>Notropis buchanani</i>	Ghost Shiner	Fish	X
<i>Notropis candidus</i>	Silverside Shiner	Fish	X
<i>Notropis chalybaeus</i>	Ironcolor Shiner	Fish	X
<i>Notropis chrosomus</i>	Rainbow Shiner	Fish	X
<i>Notropis edwardraneyi</i>	Fluvial Shiner	Fish	X
<i>Notropis girardi</i>	Arkansas River Shiner	Fish	X
<i>Notropis maculatus</i>	Taillight Shiner	Fish	X
<i>Notropis melanostomus</i>	Blackmouth Shiner	Fish	X
<i>Notropis ortenburgeri</i>	Kiamichi Shiner	Fish	X
<i>Notropis perpallidus</i>	Peppered Shiner	Fish	X
<i>Notropis potteri</i>	Chub Shiner	Fish	X
<i>Notropis rubellus rubellus</i>	Rosyface Shiner Or Roseface Shiner	Fish	X
<i>Notropis sabinae</i>	Sabine Shiner	Fish	X
<i>Notropis shumardi</i>	Silverband Shiner	Fish	X
<i>Notropis suttkusi</i>	Rocky Shiner	Fish	X
<i>Notropis texanus</i>	Weed Shiner	Fish	X
<i>Noturus eleutherus</i>	Mountain Madtom	Fish	X
<i>Noturus gladiator</i>	Piebald Madtom	Fish	X
<i>Noturus hildebrandi</i>	Least Madtom	Fish	X
<i>Noturus lachneri</i>	Ouachita Madtom	Fish	X
<i>Noturus miurus</i>	Brindled Madtom	Fish	X
<i>Noturus munitus</i>	Frecklebelly Madtom	Fish	X
<i>Noturus phaeus</i>	Brown Madtom	Fish	X
<i>Noturus stigmosus</i>	Northern Madtom	Fish	X
<i>Noturus taylori</i>	Caddo Madtom	Fish	X
<i>Opsopoeodus emiliae</i>	Pugnose Minnow	Fish	X
<i>Percina aurora</i>	Pearl Darter	Fish	X
<i>Percina copelandi</i>	Channel Darter	Fish	X
<i>Percina evides</i>	Gilt Darter	Fish	X
<i>Percina kathae</i>	Mobile Logperch	Fish	X
<i>Percina lenticula</i>	Freckled Darter	Fish	X
<i>Percina macrolepida</i>	Bigscale Logperch	Fish	X
<i>Percina maculata</i>	Blackside Darter	Fish	X
<i>Percina nasuta</i>	Longnose Darter	Fish	X
<i>Percina pantherina</i>	Leopard Darter	Fish	X
<i>Percina phoxocephala</i>	Slenderhead Darter	Fish	X
<i>Percina shumardi</i>	River Darter	Fish	X
<i>Percina suttkusi</i>	Gulf Logperch	Fish	X
<i>Percina uranidea</i>	Stargazing Darter	Fish	X
<i>Phenacobius catostomus</i>	Riffle Minnow	Fish	X
<i>Phenacobius mirabilis</i>	Suckermouth Minnow	Fish	X
<i>Pimephales tenellus</i>	Slim Minnow	Fish	X
<i>Pteronotropis hubbsi</i>	Bluehead Shiner	Fish	X
<i>Pteronotropis signipinnis</i>	Flagfin Shiner	Fish	X

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Appendix 2. Representative Species Pool for Priority Systems of the GCPOLCC

<i>Pteronotropis welaka</i>	Bluenose Shiner	Fish	X
<i>Sander canadensis</i>	Sauger	Fish	X
<i>Scaphirhynchus suttkusi</i>	Alabama Sturgeon	Fish	X
<i>Stizostedion vitreum</i>	Walleye	Fish	X
<i>Graptemys barbouri</i>	Barbour's Map Turtle	Reptiles	X
<i>Graptemys ernsti</i>	Escambia Map Turtle	Reptiles	X
<i>Graptemys flavimaculata</i>	Yellow-blotched Map Turtle	Reptiles	X
<i>Graptemys gibbonsi</i>	Pascagoula Map Turtle	Reptiles	X
<i>Graptemys nigrinoda</i>	Black-knobbed Map Turtle	Reptiles	X
<i>Graptemys oculifera</i>	Ringed Map Turtle	Reptiles	X
<i>Graptemys ouachitensis</i>	Ouachita Map Turtle	Reptiles	X
<i>Graptemys pseudogeographica</i>	Mississippi Map Turtle	Reptiles	X
<i>Graptemys pulchra</i>	Alabama Map Turtle	Reptiles	X
<i>Nerodia cyclopion</i>	Green Water Snake	Reptiles	X
<i>Nerodia erythrogaster</i>	Yellowbelly Water Snake	Reptiles	X
<i>Nerodia fasciata</i>	Broad-banded Water Snake	Reptiles	X
<i>Nerodia rhombifer</i>	Diamondback Water Snake	Reptiles	X
<i>Pseudemys alabamensis</i>	Alabama Red-bellied Turtle	Reptiles	X
<i>Regina rigida</i>	Crayfish Snake	Reptiles	X
<i>Regina septemvittata</i>	Queen Snake	Reptiles	X
<i>Sternotherus carinatus</i>	Razor-backed Musk Turtle	Reptiles	X
<i>Sternotherus depressus</i>	Flattened Musk Turtle	Reptiles	X
<i>Sternotherus minor peltifer</i>	Stripe-necked Musk Turtle	Reptiles	X

Appendix 2. Representative Species Pool for Priority Systems of the GCPOLCC

OZARK HIGHLANDS

Upland Hardwoods

Scientific Name	Common Name	Taxon	Upland Hardwoods
<i>Ambystoma annulatum</i>	Ringed Salamander	Amphibians	X
<i>Ambystoma tigrinum tigrinum</i>	Eastern Tiger Salamander	Amphibians	X
<i>Eurycea tynesensis</i>	Oklahoma Salamander	Amphibians	X
<i>Gastrophryne olivacea</i>	Great Plains Narrowmouth Toad	Amphibians	X
<i>Hemidactylium scutatum</i>	Four-toed Salamander	Amphibians	X
<i>Plethodon angusticlavius</i>	Ozark Salamander	Amphibians	X
<i>Plethodon serratus</i>	Southern Red-backed Salamander	Amphibians	X
<i>Rana sylvatica</i>	Wood Frog	Amphibians	X
<i>Scaphiopus hurterii</i>	Hurter's Spadefoot	Amphibians	X
<i>Aimophila aestivalis</i>	Bachman's Sparrow	Birds	X
<i>Caprimulgus carolinensis</i>	Chuck-will's-widow	Birds	X
<i>Caprimulgus vociferus</i>	Whip-poor-will	Birds	X
<i>Certhia americana</i>	Brown Creeper	Birds	X
<i>Coccyzus americanus</i>	Yellow-billed Cuckoo	Birds	X
<i>Colinus virginianus</i>	Northern Bobwhite	Birds	X
<i>Dendroica cerulea</i>	Cerulean Warbler	Birds	X
<i>Dendroica discolor</i>	Prairie Warbler	Birds	X
<i>Helminthos vermivorus</i>	Worm-eating Warbler	Birds	X
<i>Hylocichla mustelina</i>	Wood Thrush	Birds	X
<i>Melanerpes erythrocephalus</i>	Red-headed Woodpecker	Birds	X
<i>Oporornis formosus</i>	Kentucky Warbler	Birds	X
<i>Passerina ciris</i>	Painted Bunting	Birds	X
<i>Pipilo erythrophthalmus</i>	Easterntowhee	Birds	X
<i>Scolopax minor</i>	American Woodcock	Birds	X
<i>Seiurus motacilla</i>	Louisiana Waterthrush	Birds	X
<i>Thryomanes bewickii</i>	Bewick's Wren	Birds	X
<i>Vermivora pinus</i>	Blue-winged Warbler	Birds	X
<i>Wilsonia citrina</i>	Hooded Warbler	Birds	X
<i>Fritillaria</i> spp.	Fritillary butterflies	Insects	X
<i>Nicrophorus americanus</i>	American Burying Beetle	Insects	X
<i>Cervus canadensis</i>	Elk Or Wapiti	Mammals	X
<i>Corynorhinus townsendii ingens</i>	Ozark Big-eared Bat	Mammals	X
<i>Lasionycteris noctivagans</i>	Silver-haired Bat	Mammals	X
<i>Myotis grisescens</i>	Gray Myotis	Mammals	X
<i>Myotis leibii</i>	Eastern Small-footed Bat	Mammals	X
<i>Myotis septentrionalis</i>	Northern Long-eared Myotis	Mammals	X
<i>Myotis sodalis</i>	Indiana Myotis	Mammals	X
<i>Spilogale putorius</i>	Eastern Spotted Skunk	Mammals	X
<i>Ursus americanus</i>	Black Bear	Mammals	X
<i>Ophisaurus attenuatus attenuatus</i>	Western Slender Glass Lizard	Reptiles	X
<i>Terrapene ornata ornata</i>	Ornate Box Turtle	Reptiles	X

Appendix 2. Representative Species Pool for Priority Systems of the GCPOLCC

OZARK HIGHLANDS

Freshwater Aquatic: High gradient streams and rivers

Scientific Name	Common Name	Taxon	Hi-Gradient Streams
<i>Cryptobranchus alleganiensis bishopi</i>	Ozark Hellbender	Amphibians	X
<i>Eurycea tynnerensis</i>	Oklahoma Salamander	Amphibians	X
<i>Cryptobranchus a. alleganiensis</i>	Eastern Hellbender	Amphibians	X
<i>Alasmidonta viridis</i>	Slippershell Mussel	Bivalves	X
<i>Amblema plicata</i>	Threeridge Mussel	Bivalves	X
<i>Elliptio dilatata</i>	Spike	Bivalves	X
<i>Epioblasma florentina curtisii</i>	Curtis Pearlymussel	Bivalves	X
<i>Epioblasma turgidula</i>	Turgid Blossom	Bivalves	X
<i>Fusconaia flava</i>	Wabash pigtoe	Bivalves	X
<i>Fusconaia ozarkensis</i>	Ozark Pigtoe	Bivalves	X
<i>Lampsilis cardium</i>	Plain Pocketbook	Bivalves	X
<i>Lampsilis reeveiana</i>	Arkansas Brokenray	Bivalves	X
<i>Strophitus undulatus</i>	Creeper	Bivalves	X
<i>Villosa lienosa</i>	Little Spectaclecase	Bivalves	X
<i>Orconectes macrus</i>	Neosho Midget Crayfish	Crustaceans	X
<i>Orconectes marchandi</i>	Mammoth Spring Crayfish	Crustaceans	X
<i>Orconectes neglectus chaenodactylus</i>	Ringed Crayfish	Crustaceans	X
<i>Orconectes williamsi</i>	William's Crayfish	Crustaceans	X
<i>Cambarus hubbsi</i>	Hubb's Crayfish	Crustaceans	X
<i>Cambarus maculatus</i>	Freckled Crayfish	Crustaceans	X
<i>Orconectes eupunctus</i>	Coldwater Crayfish	Crustaceans	X
<i>Orconectes meeki meeki</i>	Meek's Crayfish	Crustaceans	X
<i>Orconectes peruncus</i>	Big Creek Crayfish	Crustaceans	X
<i>Orconectes quadruncus</i>	St. Francis River Crayfish	Crustaceans	X
<i>Ammocrypta clara</i>	Western Sand Darter	Fish	X
<i>Crystallaria asprella</i>	Crystal Darter	Fish	X
<i>Cycleptus elongatus</i>	Blue Sucker	Fish	X
<i>Cyprinella camura</i>	Bluntnose Shiner	Fish	X
<i>Cyprinella spiloptera</i>	Spotfin Shiner	Fish	X
<i>Erimystax harryi</i>	Ozark Chub	Fish	X
<i>Etheostoma cragini</i>	Arkansas Darter	Fish	X
<i>Etheostoma fragi</i>	Strawberry River Darter	Fish	X
<i>Etheostoma microperca</i>	Least Darter	Fish	X
<i>Etheostoma moorei</i>	Yellowcheek Darter	Fish	X
<i>Etheostoma uniporum</i>	Current Darter	Fish	X
<i>Lampetra aepyptera</i>	Least Brook Lamprey	Fish	X
<i>Lampetra appendix</i>	American Brook Lamprey	Fish	X
<i>Moxostoma anisurum</i>	Silver Redhorse	Fish	X
<i>Moxostoma macrolepidotum</i>	Shorthead Redhorse	Fish	X
<i>Nocomis asper</i>	Redspot Chub	Fish	X
<i>Notropis ozarcanus</i>	Ozark Shiner	Fish	X
<i>Notropis sabinae</i>	Sabine Shiner	Fish	X
<i>Percina nasuta</i>	Longnose Darter	Fish	X
<i>Percina phoxocephala</i>	Slenderhead Darter	Fish	X
<i>Percina uranidea</i>	Stargazing Darter	Fish	X
<i>Etheostoma euzonum erizonum</i>	Current Saddled Darter	Fish	X
<i>Etheostoma euzonum euzonum</i>	Arkansas Saddled Darter	Fish	X

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Appendix 2. Representative Species Pool for Priority Systems of the GCPOLCC

<i>Etheostoma histrio</i>	Harlequin Darter	Fish	X
<i>Etheostoma nianguae</i>	Niangua Darter	Fish	X
<i>Etheostoma whipplei</i>	Redfin Darter	Fish	X
<i>Hybognathus hankinsoni</i>	Brassy Minnow	Fish	X
<i>Hybopsis amnis</i>	Pallid Shiner	Fish	X
<i>Ichthyomyzon gagei</i>	Southern Brook Lamprey	Fish	X
<i>Noturus eleutherus</i>	Mountain Madtom	Fish	X
<i>Noturus flavater</i>	Checkered Madtom	Fish	X
<i>Noturus placidus</i>	Neosho Madtom	Fish	X
<i>Percina copelandi</i>	Channel Darter	Fish	X
<i>Percina cymatotaenia</i>	Bluestripe Darter	Fish	X
<i>Percina shumardi</i>	River Darter	Fish	X
<i>Etheostoma punctulatum</i>	Sunburst (stippled) Darter	Fish	X
<i>Luxilus cardinalis</i>	Cardinal Shiner	Fish	X
<i>Notropis greenei</i>	Wedgespot Shiner	Fish	X
<i>Notropis nubilus</i>	Ozark Minnow	Fish	X
<i>Percina maculata</i>	Blackside Darter	Fish	X

Appendix 2. Representative Species Pool for Priority Systems of the GCPOLCC

GULF COAST

Beaches and Dunes

Scientific Name	Common Name	Taxon	Beaches/Dunes
<i>Charadrius melodus</i>	Piping Plover	Birds	x
<i>Charadrius nivosus</i>	Snowy Plover	Birds	x
<i>Charadrius wilsonia</i>	Wilson's Plover	Birds	x
<i>Chordeiles minor</i>	Common Nighthawk	Birds	x
<i>Egretta rufescens</i>	Reddish Egret	Birds	x
<i>Haematopus palliatus</i>	American Oystercatcher	Birds	x
<i>Nycticorax nycticorax</i>	Black-crowned Night-heron	Birds	x
<i>Pandion haliaetus</i>	Osprey	Birds	x
<i>Pelecanus occidentalis</i>	Brown Pelican	Birds	x
<i>Rynchops niger</i>	Black Skimmer	Birds	x
<i>Sterna antillarum</i>	Least Tern	Birds	x
<i>Peromyscus polionotus allophrys</i>	Choctawhatchee Beach Mouse	Mammals	x
<i>Peromyscus polionotus ammobates</i>	Alabama Beach Mouse	Mammals	x
<i>Peromyscus polionotus leucocephalus</i>	Santa Rosa Beach Mouse	Mammals	x
<i>Peromyscus polionotus niveiventris</i>	Southeastern Beach Mouse	Mammals	x
<i>Peromyscus polionotus peninsularis</i>	St. Andrews Beach Mouse	Mammals	x
<i>Peromyscus polionotus phasma</i>	Anastasia Island Beach Mouse	Mammals	x
<i>Peromyscus polionotus trissyllepsis</i>	Perdido Key Beach Mouse	Mammals	x
<i>Procyon lotor</i>	Raccoon	Mammals	x
<i>Caretta caretta</i>	Loggerhead Sea Turtle	Reptiles	x
<i>Chelonia mydas</i>	Green Sea Turtle	Reptiles	x
<i>Malaclemys terrapin</i>	Diamondback Terrapin	Reptiles	x

Appendix 2. Representative Species Pool for Priority Systems of the GCPOLCC

GULF COAST

Tidal Marsh

Scientific Name	Common Name	Taxon	Tidal Marsh
<i>Ammodramus maritimus</i>	Seaside Sparrow	Birds	X
<i>Ammodramus nelsoni</i>	Nelson's Sparrow	Birds	X
<i>Anas fulvigula</i>	Mottled Duck	Birds	X
<i>Ardea alba</i>	Great Egret	Birds	X
<i>Aythya affinis</i>	Lesser Scaup	Birds	X
<i>Aythya americana</i>	Redhead	Birds	X
<i>Aythya marila</i>	Greater Scaup	Birds	X
<i>Cistothorus palustris</i>	Marsh Wren	Birds	X
<i>Coturnicops noveboracensis</i>	Yellow Rail	Birds	X
<i>Dendrocygna bicolor</i>	Fulvous Whistling-duck	Birds	X
<i>Egretta caerulea</i>	Little Blue Heron	Birds	X
<i>Egretta thula</i>	Snowy Egret	Birds	X
<i>Egretta tricolor</i>	Tricolored Heron	Birds	X
<i>Eudocimus albus</i>	White Ibis	Birds	X
<i>Gallinula chloropus</i>	Common Moorhen	Birds	X
<i>Himantopus mexicanus</i>	Black-necked Stilt	Birds	X
<i>Ixobrychus exilis</i>	Least Bittern	Birds	X
<i>Laterallus jamaicensis</i>	Black Rail	Birds	X
<i>Platalea ajaja</i>	Roseate Spoonbill	Birds	X
<i>Plegadis falcinellus</i>	Glossy Ibis	Birds	X
<i>Podilymbus podiceps</i>	Pied-billed Grebe	Birds	X
<i>Porphyrio martinica</i>	Purple Gallinule	Birds	X
<i>Rallus elegans</i>	King Rail	Birds	X
<i>Rallus longirostris</i>	Clapper Rail	Birds	X
<i>Sterna caspia</i>	Caspian Tern	Birds	X
<i>Sterna forsteri</i>	Forster's Tern	Birds	X
<i>Sterna maxima</i>	Royal Tern	Birds	X
<i>Sterna nilotica</i>	Gull-billed Tern	Birds	X
<i>Sterna sandvicensis</i>	Sandwich Tern	Birds	X
<i>Archosargus probatocephalus</i>	Sheepshead	Fish	X
<i>Brevoortia patronus</i>	Gulf Menhaden	Fish	X
<i>Cynoscion nebulosus</i>	Speckled Trout	Fish	X
<i>Fundulus jenkinsi</i>	Saltmarsh Topminnow	Fish	X
<i>Mugil cephalus</i>	Striped Mullet	Fish	X
<i>Mugil curema</i>	White Mullet	Fish	X
<i>Paralichthys albigutta</i>	Gulf Flounder	Fish	X
<i>Paralichthys lethostigma</i>	Southern Flounder	Fish	X
<i>Pogonias cromis</i>	Black Drum	Fish	X
<i>Sciaenops ocellatus</i>	Red Drum	Fish	X
<i>Mustela vison halimnetes</i>	Gulf Salt Marsh Mink	Mammals	X
<i>Procyon lotor</i>	Raccoon	Mammals	X
<i>Sylvilagus aquaticus</i>	Swamp Rabbit	Mammals	X
<i>Sylvilagus palustris</i>	Marsh Rabbit	Mammals	X
<i>Trichechus manatus</i>	West Indian Manatee	Mammals	X
<i>Malaclemys terrapin</i>	Diamondback Terrapin	Reptiles	X
<i>Nerodia clarkii</i>	Saltmarsh Snake	Reptiles	X

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MISSISSIPPI ALLUVIAL VALLEY

Freshwater Aquatic: Mainstem “Big River” Systems

Table 1. Desired Landscape Endpoints for Big Rivers and Initial Assessment of Species Limited by Habitat Characteristics Reflective of These Endpoints, DRAFT - April 2013.			
Desired Landscape Endpoints	Pallid Sturgeon	Alligator Gar	Paddlefish
Diversity and connectivity of habitats			
Main Channel			
Secondary Channel	X		
Off-channel, deep water refugia			
Seasonally-inundated wetlands		X	
Adequate flow	X		X
Dissolved oxygen			
Temperature			

MISSISSIPPI ALLUVIAL VALLEY

Forested wetlands

Table 2. Desired Landscape Endpoints for Forested Wetlands and Initial Assessment of Species Limited by Habitat Characteristics Reflective of These Endpoints, DRAFT - April 2013.

Desired Landscape Endpoints	Black Bear	Rafinesque's Big-Eared Bat	Swallow- tailed Kite	Red-headed Woodpecker	Swainson's Warbler	Kentucky Warbler	Hooded Warbler
Landscape Composition (<70% forest)	X						
Large Forest Patch Size (>100,000 ac)	X		X				
Canopy Cover (60-70%)				X			
Understory Density (25-40%)					X	X	X
Large (>26" dbh) Snag Density (1 per 5 ac)	X	X					
Occurrence of Cane					X		X

EAST AND WEST GULF COASTAL PLAINS

Open Pine Woodland and Savanna

Table 3. Desired Landscape Endpoints for Open Pine Woodlands and Savannas and Initial Assessment of Species Limited by Habitat Characteristics Reflective of These Endpoints, DRAFT - April 2013.

Desired Landscape Endpoints	Red-cockaded Woodpecker	Louisiana Pine Snake	Brown-headed Nuthatch	Bachman's Sparrow	Northern Bobwhite	Pine Warbler	Gopher Tortoise	Prairie Warbler	Eastern Diamondback Rattlesnake	Pocket Gopher
Forest patch size	X									
Connectivity	X	X	X	X						
Basal Area					X					
Average dbh	X		X			X				
Canopy Cover		X		X	X		X			
Midstory Shrub Density								X		
Midstory Hardwoods		X					X		X	
Herbaceous Understory		X		X			X		X	X
Early Successional				X	X			X		

EAST AND WEST GULF COASTAL PLAINS

Grassland-Prairie-Savanna

Table 4. Desired Landscape Endpoints for Grasslands and Initial Assessment of Species Limited by Habitat Characteristics Reflective of These Endpoints, DRAFT - April 2013.							
Desired Landscape Endpoints	Grasshopper Sparrow	Northern Bobwhite	Dickcissel	Henslow's Sparrow	Texas Horned Lizard	Eastern Meadowlark	Painted Bunting
Prairie patch size	X	X					
Vegetation Height			X				
Vegetation Density		X		X	X	X	
Bare Ground		X					
Shrub Cover		X					X
Tree Density	X		X				
Warm Season Grass Density		X					

EAST AND WEST GULF COASTAL PLAINS

Freshwater Aquatic: Medium-low gradient streams and rivers

Table 5. Desired Landscape Endpoints for Medium-low gradient streams and rivers and Initial Assessment of Species Limited by Habitat Characteristics Reflective of These Endpoints, DRAFT - April 2013							
Desired Landscape Endpoints	Alligator Gar	Paddlefish	River Otter	Mussels	Darters	Crayfish Snake	Hellbender
Connectivity	X	X	X				
Water temperature	X						
Flow				X			
Riffle-pool morphology					X	X	
Substrate diversity							X

Appendix 3: DRAFT Landscape and Species Endpoints for Priority Systems of the GCPOLCC

OZARK HIGHLANDS

Upland Hardwoods

Table 6. Desired Landscape Endpoints for Upland Hardwoods and Initial Assessment of Species Limited by Habitat Characteristics Reflective of These Endpoints, DRAFT - April 2013.														
Desired Landscape Endpoints	Cerulean Warbler	Kentucky Warbler	Yellow-billed Cuckoo	Black Bear	Elk	Red-backed Salamander	Nightjars	Prairie Warbler	Silver-haired Bat	Indiana Myotis	Wood Thrush	Wild Turkey	Spotted Skunk	Woodcock
Forest patch size	X													
Landscape composition	X	X	X											
Connectivity				X	X	X								
Canopy Cover														
Woodlands (20-80%)							X	X						
Forest (>80%)	X	X				X								
Large Snag Density									X					
Coarse Woody Debris						X								
Average dbh >14"										X				
Tree density														
Woodlands (40/ac)							X			X				
Forest (80/ac)											X			
Midstory density											X			
Oak-hickory basal area														
Woodlands (>90%)												X		
Forest (>70%)				X								X		
Early successional													X	X

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Appendix 3: DRAFT Landscape and Species Endpoints for Priority Systems of the GCPOLCC

OZARK HIGHLANDS

Freshwater Aquatic: High gradient streams and rivers

Table 7. Desired Landscape Endpoints for High Gradient Streams and Rivers and Initial Assessment of Species Limited by Habitat Characteristics Reflective of These Endpoints, DRAFT - April 2013.

Desired Landscape Endpoints	Yellowcheek Darter	Hellbender	Pocket Mussels	Darters	Sculpin	Coldwater Crayfish	Brindled Madtom	Southern Brook Lamprey	Mussels	Bluestripe Darter
Forested watersheds with <10% impervious										
Intact riparian, hardwood corridors										
Interconnected streams and rivers	X									
High water quality		X	X	X						
Low water temperatures		X		X	X	X				
High dissolved oxygen		X								
Minimal sediment		X							X	
Abundant leaf litter						X	X	X		
Flow regime										
Groundwater				X	X	X			X	
Runoff										X
Intermittent										

GULF COAST

Beaches and Dunes

Table 8. Desired Landscape Endpoints for Beaches and Dunes and Initial Assessment of Species Limited by Habitat Characteristics Reflective of These Endpoints, DRAFT - April 2013.

Desired Landscape Endpoints	Beach Mice	Diamondback Terrapin	Wilson's Plover	Least Tern	Black Skimmer	Sea Turtles	Reddish Egret
Connectivity	X	X					X
Disturbance: No Access	X		X	X	X	X	
Occurrence of 1', 2', and 3' Dunes	X						
Vegetative Cover >20%							
Dune Width (20')							
Dune Height (4')							
Dune Slope (18-45 degrees)							
Composition							
Sea Oats	X						
Bitter Panicum		X					
Spartina patens		X					

GULF COAST

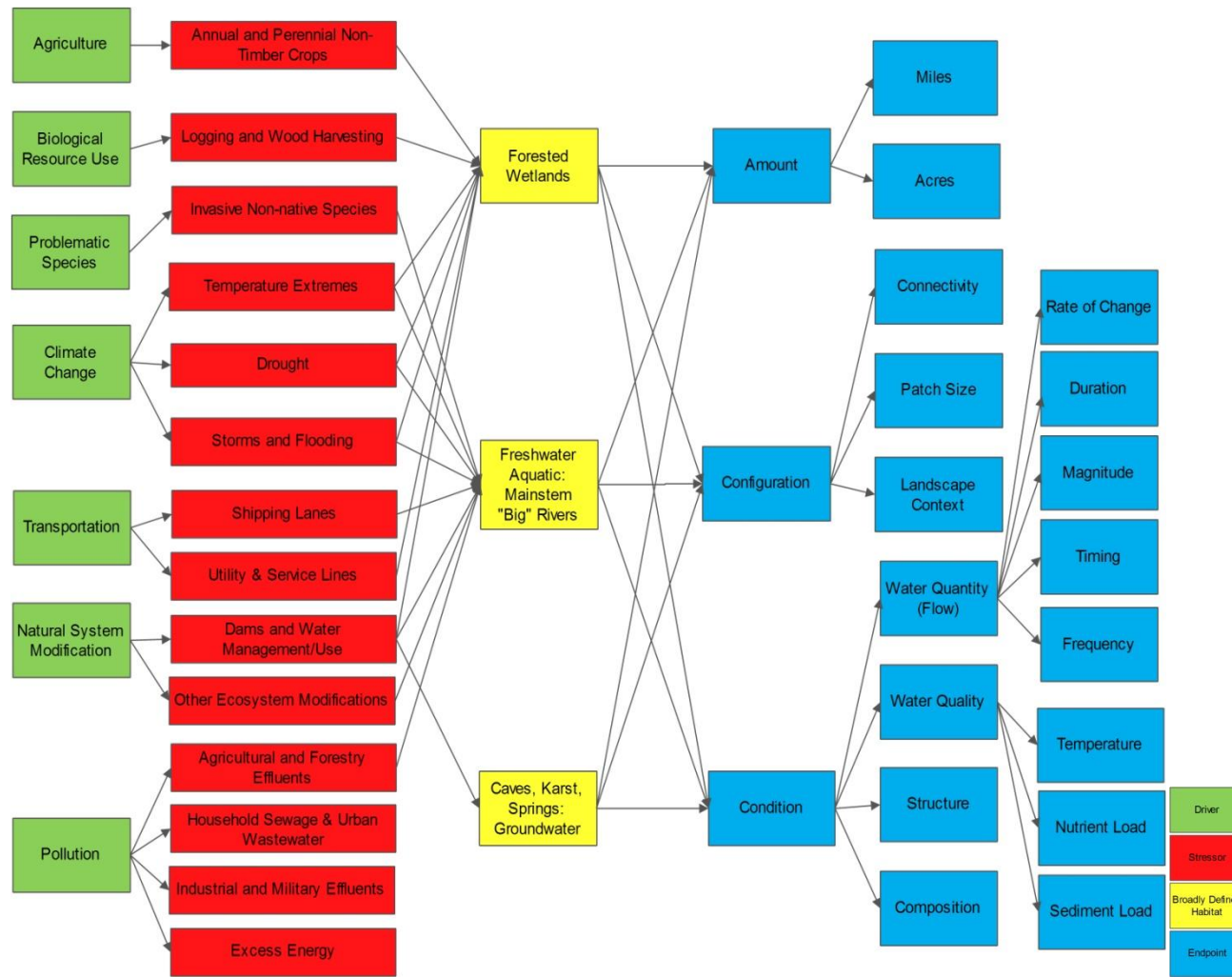
Tidal Marsh

Table 9. Desired Landscape Endpoints for Tidal Marsh and Initial Assessment of Species Limited by Habitat Characteristics Reflective of These Endpoints, DRAFT - April 2013.

Desired Landscape Endpoints	River Otter	Mink	Black Bear	Penaid Shrimp	Clapper Rail	King Rail	Redhead	Scaup	Manatee	Speckled Trout	Oysters	Black Bass
Large blocks of unbroken marsh (>250 ac)	X	X										
Connectivity of habitat types	X	X	X									
Moderate amounts of edge				X	X							
Emergent Vegetative Cover >70%					X	X						
Limited Open Water (<20%)												
Submergent Aquatic Vegetation (15-30%)							X	X	X			
Natural salinity										X	X	
Composition – native vegetation												
Adequate freshwater flows			X									X

Appendix 4: Conceptual Models for Priority Systems of the GCPOLCC

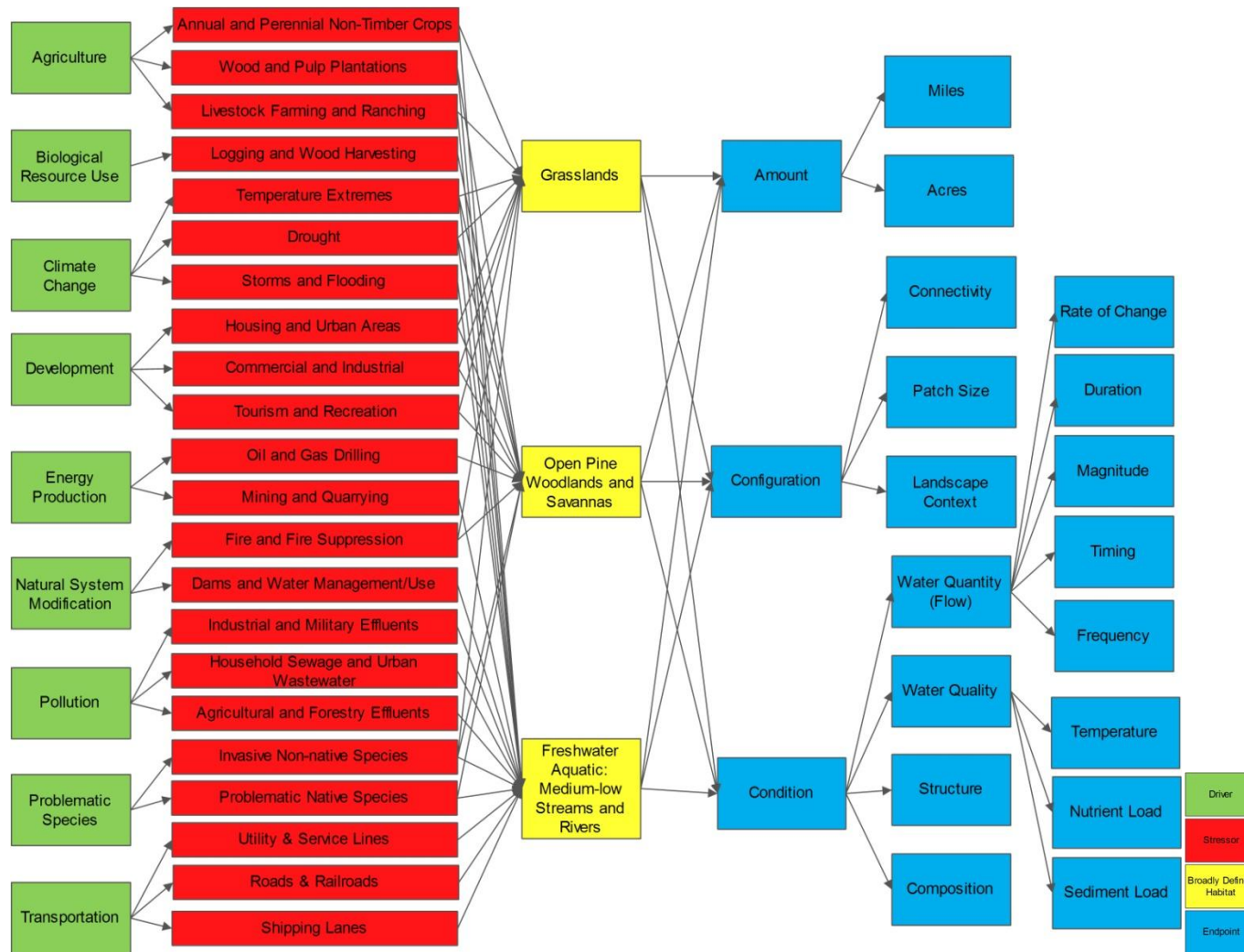
Mississippi Alluvial Valley



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Appendix 4: Conceptual Models for Priority Systems of the GCPOLCC

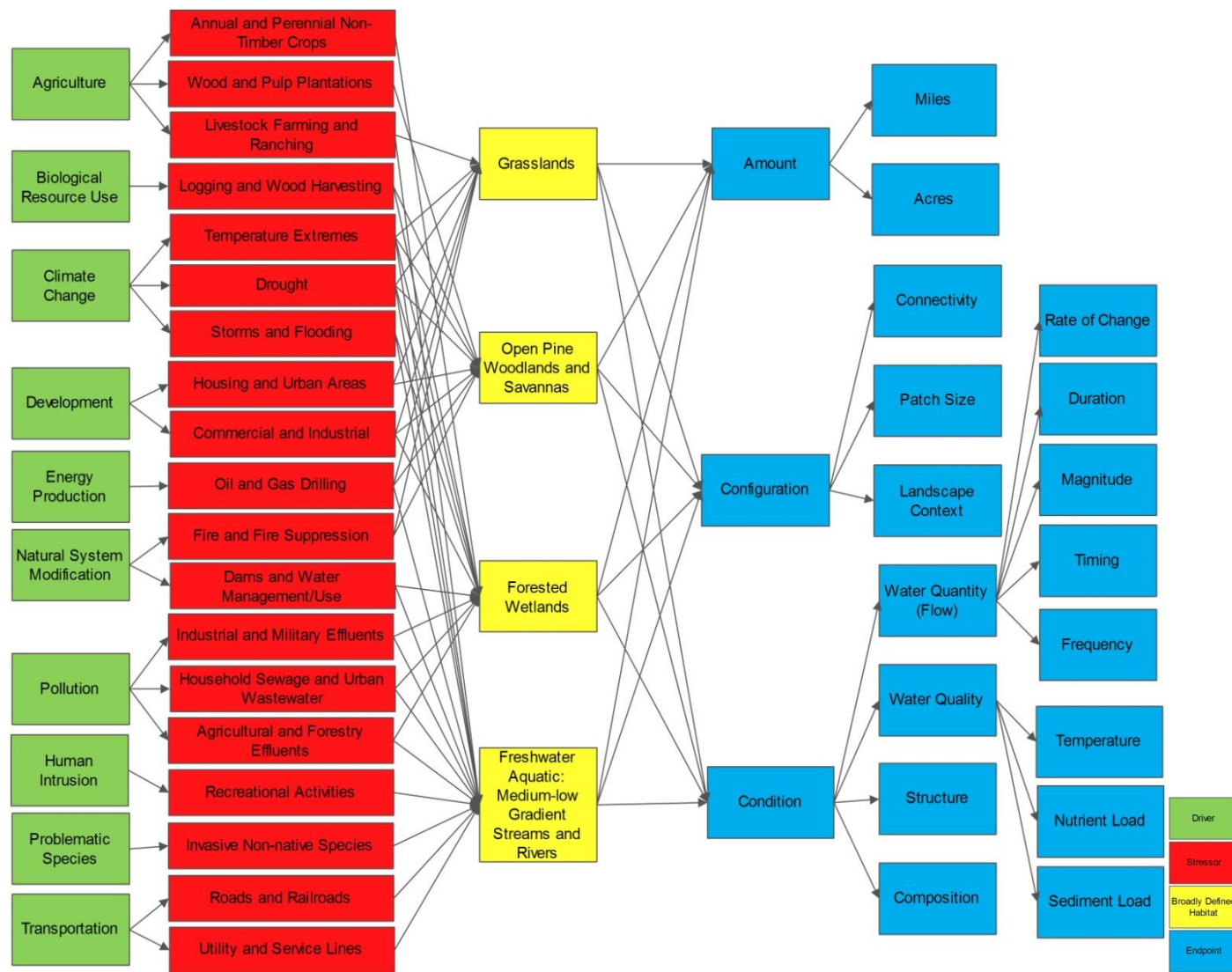
East Gulf Coastal Plain



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Appendix 4: Conceptual Models for Priority Systems of the GCPOLCC

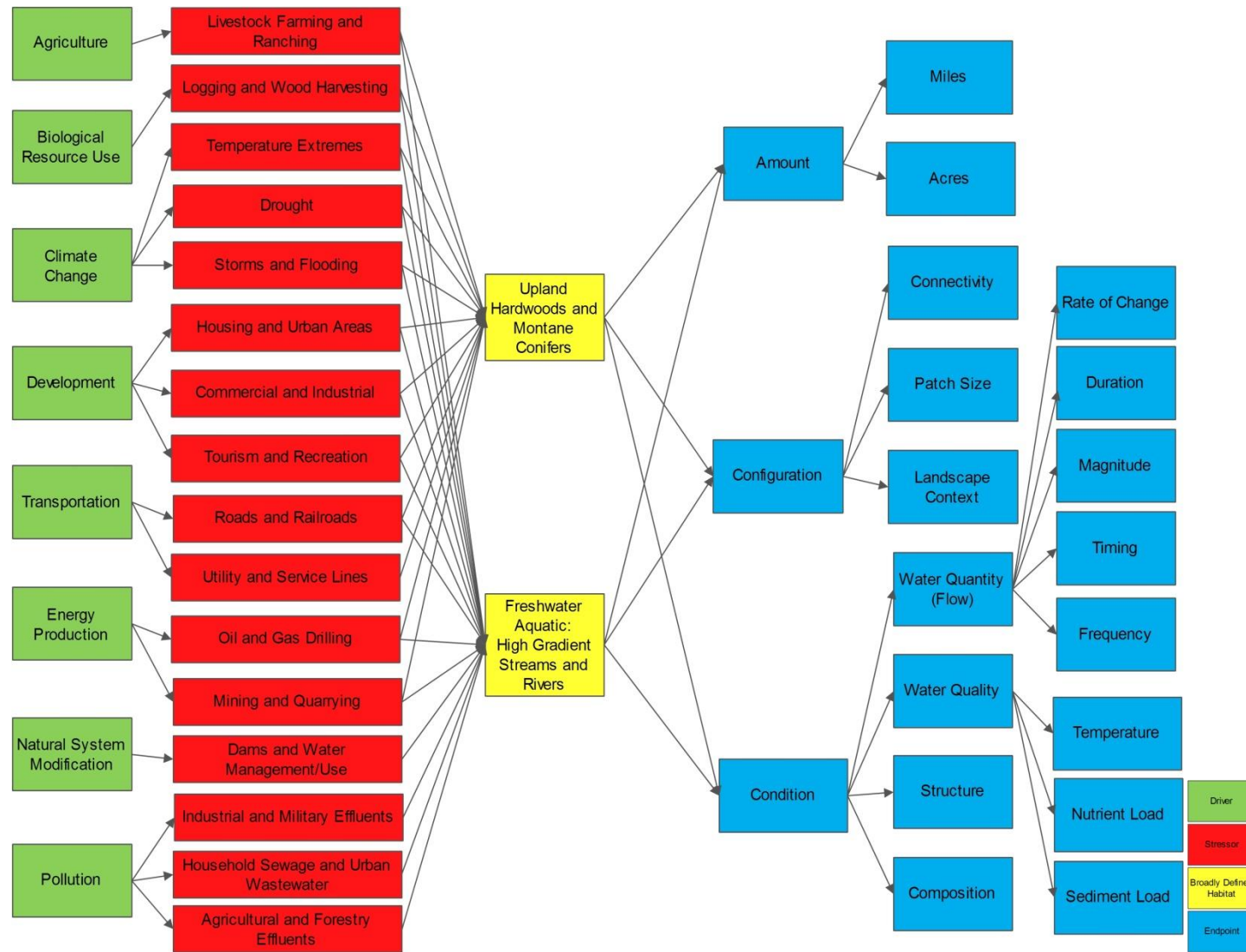
West Gulf Coastal Plain



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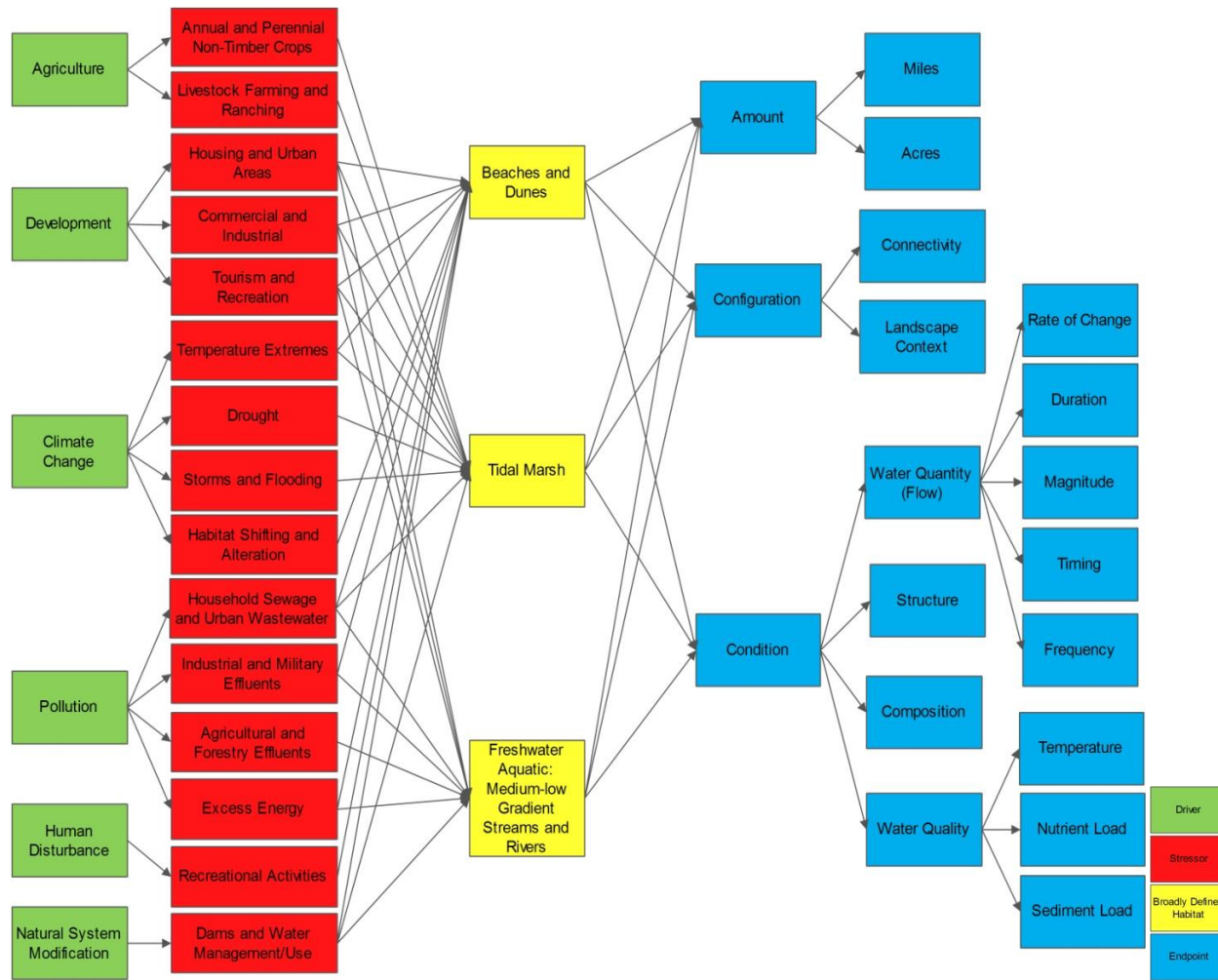
Ozark Highlands



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Gulf Coast



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Table 2. Drivers, stressors, mechanisms, and landscape-level endpoints for priority habitat types of the Gulf Coastal Plains and Ozarks subgeographies

Region	Driver	Stressor	Mechanism	Priority Habitat	Endpoint
GC	Development	Housing & Urban Areas	Direct Conversion	Tidal Marsh	Amount (acres); Configuration (Landscape Context; Connectivity)
GC	Development	Commercial & Industrial	Direct Conversion	Tidal Marsh	Amount (acres); Configuration (Landscape Context; Connectivity)
GC	Development	Tourism & Recreation	Direct Conversion	Tidal Marsh	Amount (acres); Configuration (Landscape Context; Connectivity)
GC	Pollution	Household Sewage & Urban Waste Water	Increased Nutrients, Sediments, and Contaminants in runoff	Tidal Marsh	Amount (acres); Water Quality (Nutrient Load; Sediment Load)
GC	Natural System Modification	Dams & Water Management/Use	Flood protection and water use in developed and agricultural areas	Tidal Marsh	Amount (acres); Water Quantity (Flow)
GC	Agriculture	Annual and Perennial Non-timber Crops	Direct Conversion	Tidal Marsh	Amount (acres); Configuration (Landscape Context; Connectivity)
GC	Agriculture	Livestock Farming & Ranching	Direct Conversion	Tidal Marsh	Amount (acres); Configuration (Landscape Context; Connectivity)
GC	Climate Change	Temperature Extremes	Increased temperature	Tidal Marsh	Amount (acres); Water Quantity (Flow)
GC	Climate Change	Droughts	Changes in precipitation patterns	Tidal Marsh	Amount (acres); Water Quantity (Flow)
GC	Climate Change	Storms & Flooding	Changes in precipitation patterns	Tidal Marsh	Amount (acres); Water Quantity (Flow)
GC	Development	Housing & Urban Areas	Direct Conversion	Beaches and Dunes	Amount (acres); Configuration (Connectivity)
GC	Development	Commercial & Industrial	Direct Conversion	Beaches and Dunes	Amount (acres); Configuration (Connectivity)
GC	Development	Tourism & Recreation	Direct Conversion	Beaches and Dunes	Amount (acres); Configuration (Connectivity)
GC	Pollution	Excess Energy	Noise and Light from Development	Beaches and Dunes	Condition (Structure)
GC	Climate Change	Temperature Extremes	Increased temperature	Beaches and Dunes	Condition (Composition)
GC	Climate Change	Habitat Shifting & Alteration	Sea-level Rise: Increased Inundation and Erosion	Beaches and Dunes	Amount (acres); Configuration (Connectivity)
GC	Human Disturbance	Recreational Activities	Increased trampling and raking/grading	Beaches and Dunes	Condition (Structure and Composition)
GC	Pollution	Household Sewage & Urban Waste Water	Change in sediment budget	Beaches and Dunes	Amount (acres); Condition (Structure)
GC	Pollution	Industrial and Military Effluents	Change in sediment budget	Beaches and Dunes	Amount (acres); Condition (Structure)
GC	Natural System Modification	Dams & Water Management/Use	Increased erosion due to changes in flow from development	Beaches and Dunes	Amount (acres); Configuration (Connectivity); Condition (Structure)
GC	Development	Housing & Urban Areas	Direct Conversion and physical change in stream systems	Streams and Rivers	Amount (miles); Configuration (Landscape context); Condition (Structure)
GC	Development	Commercial & Industrial	Direct Conversion and physical change in stream systems	Streams and Rivers	Amount (miles); Configuration (Landscape context); Condition (Structure)
GC	Development	Tourism & Recreation	Direct Conversion and physical change in stream systems	Streams and Rivers	Amount (miles); Configuration (Landscape context); Condition (Structure)

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GC	Natural System Modification	Dams & Water Management/Use	Hydrologic Alteration from development, transportation, and recreation	Streams and Rivers	Amount (miles); Configuration (Landscape context); Condition (Structure); Water Quantity
GC	Pollution	Household Sewage & Urban Waste Water	Change in sediment budget and increased contaminants - development	Streams and Rivers	Water Quality (Nutrient Load; Sediment Load)
GC	Pollution	Industrial and Military Effluents	Change in sediment budget and increased contaminants from industry	Streams and Rivers	Water Quality (Nutrient Load; Sediment Load)
GC	Pollution	Agricultural and Forestry Effluents	Increased sediment and contaminants from agriculture	Streams and Rivers	Water Quality (Nutrient Load; Sediment Load)
GC	Pollution	Excess Energy	Increased temperature; thermal pollution	Streams and Rivers	Water Quality (Temperature)
EGCP	Transportation	Shipping Lanes	Dredging, channelization	Streams and Rivers	Amount (acres); Water Quantity (Flow)
EGCP	Transportation	Roads & Railroads	Bridges and roads	Streams and Rivers	Amount (acres); Water Quantity (Flow)
EGCP	Transportation	Utility & Service Lines	ROWs	Streams and Rivers	Amount (acres); Water Quantity (Flow)
EGCP	Natural System Modification	Dams & Water Management/Use	Barriers, sinuosity; flow control	Streams and Rivers	Amount (miles); Configuration (Connectivity); Water Quantity (Flow)
EGCP	Problematic Species	Invasive Non-Native	Pests and Pathogens	Streams and Rivers	Condition (Composition)
EGCP	Problematic Species	Problematic Native Species	Pests and Pathogens	Streams and Rivers	Condition (Composition)
EGCP	Pollution	Agricultural & Forestry Effluents	Contaminants and Nutrients	Streams and Rivers	Water Quality (Nutrient Load; Sediment Load)
EGCP	Pollution	Household Sewage & Urban Wastewater	Increased impervious surface: contaminants and nutrients	Streams and Rivers	Water Quality (Nutrient Load; Sediment Load)
EGCP	Pollution	Industrial & Military Effluents	Mining	Streams and Rivers	Water Quality (Nutrient Load; Sediment Load)
EGCP	Agriculture	Annual and Perennial Non-timber Crops	Direct Conversion: Land leveling, removal of vegetation	Streams and Rivers	Amount (miles); Configuration (Connectivity); Water Quantity (Flow)
EGCP	Agriculture	Wood & Pulp Plantations	Direct Conversion: removal of vegetation	Streams and Rivers	Amount (miles); Configuration (Connectivity); Water Quantity (Flow)
EGCP	Agriculture	Livestock Farming & Ranching	Direct Conversion: removal of vegetation, cattle stocking density	Streams and Rivers	Amount (miles); Configuration (Connectivity); Water Quantity (Flow)
EGCP	Climate Change	Temperature Extremes	Increased temperature	Streams and Rivers	Amount (miles); Configuration (Connectivity); Water Quantity (Flow)
EGCP	Climate Change	Droughts	Increased temperature and changes in precipitation patterns	Streams and Rivers	Amount (miles); Configuration (Connectivity); Water Quantity (Flow)
EGCP	Climate Change	Storms & Flooding	Changes in precipitation patterns	Streams and Rivers	Amount (miles); Configuration (Connectivity); Water Quantity (Flow)
EGCP	Energy Production	Mining & Quarrying	Gravel mining	Streams and Rivers	Amount (miles); Configuration (Landscape Context,; Connectivity); Condition (Structure)
EGCP	Problematic Species	Invasive Non-Native	Pests and pathogens	Southern Pine	Amount (acres); Configuration (Connectivity)
EGCP	Problematic Species	Problematic Native Species	Pests and pathogens	Southern Pine	Amount (acres); Configuration (Connectivity)
EGCP	Biological Resource Use	Logging and Wood Harvesting	Biomass production	Southern Pine	Amount (acres); Configuration (Connectivity)
EGCP	Agriculture	Wood & Pulp Plantations	Pine plantations	Southern Pine	Configuration (Connectivity); Condition (Structure and Composition)

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EGCP	Energy Production	Oil & Gas Drilling	Mineral/gas extraction	Southern Pine	Configuration (Connectivity); Condition (Structure and Composition)
EGCP	Climate Change	Temperature Extremes	Increased temperature	Southern Pine	Amount (acres); Configuration (Connectivity); Condition (Structure and Composition)
EGCP	Climate Change	Droughts	Increased temperature and changes in precipitation patterns	Southern Pine	Amount (acres); Configuration (Connectivity); Condition (Structure and Composition)
EGCP	Climate Change	Storms & Flooding	Changes in precipitation patterns	Southern Pine	Amount (acres); Configuration (Connectivity); Condition (Structure and Composition)
EGCP	Development	Housing & Urban Areas	Permanent loss/impervious surfaces	Grassland	Amount (acres); Configuration (Patch Size; Connectivity)
EGCP	Development	Commercial & Industrial	Permanent loss/impervious surfaces	Grassland	Amount (acres); Configuration (Patch Size; Connectivity)
EGCP	Development	Tourism & Recreation	Permanent loss/impervious surfaces	Grassland	Amount (acres); Configuration (Patch Size; Connectivity)
EGCP	Natural System Modification	Fire & Fire Suppression	Fire exclusion; woody encroachment	Grassland	Condition (Structure and Composition)
EGCP	Agriculture	Annual and Perennial Non-timber Crops	Direct conversion and loss of habitat	Grassland	Amount (acres); Configuration (Patch Size; Connectivity); Condition (Structure and Composition)
EGCP	Agriculture	Livestock Farming & Ranching	Direct conversion and loss of habitat	Grassland	Amount (acres); Configuration (Patch Size; Connectivity); Condition (Structure and Composition)
EGCP	Problematic Species	Invasive Non-Native	Conversion of grasslands from native grasses to exotics	Grassland	Condition (Composition)
EGCP	Natural System Modification	Fire & Fire Suppression	Fire exclusion; woody encroachment	Grassland	Amount (acres); Condition (Structure and Composition)
EGCP	Climate Change	Temperature Extremes	Increased temperature	Grassland	Amount (acres); Configuration (Patch Size; Connectivity); Condition (Structure and Composition)
EGCP	Climate Change	Droughts	Increased temperature and changes in precipitation patterns	Grassland	Amount (acres); Configuration (Patch Size; Connectivity); Condition (Structure and Composition)
EGCP	Climate Change	Storms & Flooding	Changes in precipitation patterns	Grassland	Amount (acres); Configuration (Patch Size; Connectivity); Condition (Structure and Composition)
OH	Climate Change	Temperature Extremes	Increased temperature	Streams and Rivers	Amount (miles); Water Quantity (Flow)
OH	Climate Change	Droughts	Increased temperature and changes in precipitation patterns	Streams and Rivers	Amount (miles); Water Quantity (Flow)
OH	Climate Change	Storms & Flooding	Changes in precipitation patterns	Streams and Rivers	Amount (miles); Water Quantity (Flow)
OH	Natural System Modification	Dams & Water Management/Use	Hydrologic Alteration - fracking, dewatering, impoundments, lagoons	Streams and Rivers	Water Quantity (Flow)
OH	Energy Production	Oil & Gas Drilling	Fragmentation due to fracking - roads, impoundments, lagoons	Streams and Rivers	Amount (miles); Configuration (Landscape Context,; Connectivity)
OH	Energy Production	Mining & Quarrying	Gravel mining	Streams and Rivers	Amount (miles); Configuration (Landscape Context,; Connectivity); Condition (Structure)
OH	Pollution	Household Sewage & Urban Waste Water	Increased contaminants in runoff	Streams and Rivers	Water quality (Nutrient Load; Sediment Load; DO; pH)
OH	Pollution	Industrial and Military Effluents	Increased contaminants in runoff	Streams and Rivers	Water quality (Nutrient Load; Sediment Load; DO; pH)
OH	Pollution	Agricultural and Forestry Effluents	Increased contaminants in runoff; CAFOs	Streams and Rivers	Water quality (Nutrient Load; Sediment Load; DO; pH)
OH	Natural System Modification	Dams & Water Management/Use	Increased impervious surface area	Streams and Rivers	Water Quantity (Flow)

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OH	Development	Housing & Urban Areas	Direct Conversion: Physical change in stream systems	Streams and Rivers	Amount (miles); Configuration (Landscape Context); Condition (Structure)
OH	Development	Commercial & Industrial	Direct Conversion: Physical change in stream systems	Streams and Rivers	Amount (miles); Configuration (Landscape Context); Condition (Structure)
OH	Development	Tourism & Recreation	Direct Conversion: Physical change in stream systems	Streams and Rivers	Amount (miles); Configuration (Landscape Context); Condition (Structure)
OH	Agriculture	Livestock Farming & Ranching	Direct Conversion: Physical change in stream systems	Streams and Rivers	Amount (miles); Configuration (Landscape Context); Condition (Structure)
OH	Transportation	Roads & Railroads	Direct Conversion: Physical change in stream systems	Streams and Rivers	Amount (miles); Configuration (Landscape Context); Condition (Structure)
OH	Transportation	Roads & Railroads	Direct Conversion and fragmentation from roads and bridges	Upland Hardwoods	Amount (acres); Configuration (Patch Size; Connectivity)
OH	Transportation	Utility & Service Lines	Direct Conversion and fragmentation from pipelines and ROWs	Upland Hardwoods	Amount (acres); Configuration (Patch Size; Connectivity)
OH	Energy Production	Oil & Gas Drilling	Fragmentation due to fracking - roads, impoundments, lagoons	Upland Hardwoods	Amount (acres); Configuration (Landscape Context,; Connectivity)
OH	Energy Production	Mining & Quarrying	Lead mining	Upland Hardwoods	Amount (acres); Configuration (Landscape Context,; Connectivity); Condition (Structure)
OH	Climate Change	Temperature Extremes	Increased temperature	Upland Hardwoods	Amount (acres); Configuration (Patch Size; Connectivity); Condition (Composition)
OH	Climate Change	Droughts	Increased temperature and changes in precipitation patterns	Upland Hardwoods	Amount (acres); Configuration (Patch Size; Connectivity); Condition (Composition)
OH	Climate Change	Storms & Flooding	Changes in precipitation patterns	Upland Hardwoods	Amount (acres); Configuration (Patch Size; Connectivity); Condition (Composition)
OH	Biological Resource Use	Logging and Wood Harvesting	Fragmentation due to timber harvest	Upland Hardwoods	Configuration (Patch Size; Connectivity); Condition (Structure)
OH	Development	Housing & Urban Areas	Loss of natural habitats to development	Upland Hardwoods	Amount (acres); Configuration (Patch Size; Connectivity)
OH	Development	Commercial & Industrial	Loss of natural habitats to development	Upland Hardwoods	Amount (acres); Configuration (Patch Size; Connectivity)
OH	Development	Tourism & Recreation	Loss of natural habitats to development	Upland Hardwoods	Amount (acres); Configuration (Patch Size; Connectivity)
OH	Agriculture	Livestock Farming & Ranching	Increased grazing	Upland Hardwoods	Amount (acres); Configuration (Patch Size; Connectivity); Condition (Structure)
WGCP	Agriculture	Wood & Pulp Plantations	Direct Conversion: removal of vegetation	Southern Pine	Amount (acres); Configuration (Patch Size; Connectivity)
WGCP	Biological Resource Use	Logging and Wood Harvesting	Temporary fragmentation due to timber harvest	Southern Pine	Amount (acres); Configuration (Patch Size; Connectivity); Condition (Structure)
WGCP	Natural System Modification	Fire & Fire Suppression	Altered fire regime; woody encroachment	Southern Pine	Condition (Structure and Composition)
WGCP	Climate Change	Temperature Extremes	Increased temperature	Southern Pine	Condition (Structure and Composition)
WGCP	Climate Change	Droughts	Increased temperature and changes in precipitation patterns	Southern Pine	Condition (Structure and Composition)
WGCP	Climate Change	Storms & Flooding	Changes in precipitation patterns	Southern Pine	Condition (Structure and Composition)
WGCP	Development	Housing & Urban Areas	Loss of natural habitat types to development	Southern Pine	Amount (acres); Configuration (Patch Size; Connectivity)
WGCP	Development	Commercial & Industrial	Loss of natural habitat types to development	Southern Pine	Amount (acres); Configuration (Patch Size; Connectivity)

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WGCP	Natural System Modification	Fire & Fire Suppression	Altered fire regime; woody encroachment	Southern Pine	Condition (Structure and Composition)
WGCP	Energy Production	Oil & Gas Drilling	Fracking and Oil Field Fragmentation	Southern Pine	Amount (acres); Configuration (Patch Size; Connectivity)
WGCP	Energy Production	Oil & Gas Drilling	Fracking and Oil Field Fragmentation	Grassland	Amount (acres); Configuration (Patch Size; Connectivity)
WGCP	Development	Housing & Urban Areas	Loss of natural habitats to development	Grassland	Amount (acres); Configuration (Patch Size; Connectivity)
WGCP	Development	Commercial & Industrial	Loss of natural habitats to development	Grassland	Amount (acres); Configuration (Patch Size; Connectivity)
WGCP	Natural System Modification	Fire & Fire Suppression	Altered fire regime; woody encroachment	Grassland	Condition (Structure and Composition)
WGCP	Agriculture	Livestock Farming & Ranching	Increased grazing	Grassland	Amount (acres); Configuration (Patch Size; Connectivity); Condition (Structure)
WGCP	Agriculture	Annual and Perennial Non-timber Crops	Loss of natural habitats	Forested Wetlands	Amount (acres); Configuration (Patch Size; Connectivity)
WGCP	Biological Resource Use	Logging and Wood Harvesting	Fragmentation due to timber harvest	Forested Wetlands	Amount (acres); Configuration (Patch Size; Connectivity); Condition (Structure)
WGCP	Climate Change	Temperature Extremes	Increased temperature	Forested Wetlands	Amount (acres); Condition (Structure and Composition)
WGCP	Climate Change	Droughts	Increased temperature and changes in precipitation patterns	Forested Wetlands	Amount (acres); Condition (Structure and Composition)
WGCP	Climate Change	Storms & Flooding	Changes in precipitation patterns	Forested Wetlands	Amount (acres); Condition (Structure and Composition)
WGCP	Development	Housing & Urban Areas	Loss of natural habitats to development	Forested Wetlands	Amount (acres); Configuration (Patch Size; Connectivity)
WGCP	Development	Commercial & Industrial	Loss of natural habitats to development	Forested Wetlands	Amount (acres); Configuration (Patch Size; Connectivity)
WGCP	Pollution	Household Sewage & Urban Waste Water	Increased contaminants in runoff	Forested Wetlands	Water quality (Nutrient Load; Sediment Load; DO; pH)
WGCP	Pollution	Industrial and Military Effluents	Increased contaminants in runoff	Forested Wetlands	Water quality (Nutrient Load; Sediment Load; DO; pH)
WGCP	Pollution	Agricultural and Forestry Effluents	Increased contaminants in runoff	Forested Wetlands	Water quality (Nutrient Load; Sediment Load; DO; pH)
WGCP	Natural System Modification	Dams & Water Management/Use	Hydrologic alteration: channelization, flood cycle	Forested Wetlands	Amount (acres); Configuration (Patch Size; Connectivity); Condition (Structure and Composition)
WGCP	Climate Change	Temperature Extremes	Increased temperature	Forested Wetlands	Amount (acres); Configuration (Patch Size; Connectivity); Condition (Structure and Composition)
WGCP	Climate Change	Droughts	Increased temperature and changes in precipitation patterns	Forested Wetlands	Amount (acres); Configuration (Patch Size; Connectivity); Condition (Structure and Composition)
WGCP	Climate Change	Storms & Flooding	Changes in precipitation patterns	Forested Wetlands	Amount (acres); Configuration (Patch Size; Connectivity); Condition (Structure and Composition)
WGCP	Agriculture	Livestock Farming & Ranching	Physical trampling	Streams and Rivers	Condition (Structure: Channel Morphology; Substrate Type)
WGCP	Pollution	Household Sewage & Urban Waste Water	Increase in impervious surfaces; wastewater treatment	Streams and Rivers	Condition (Water Quality: Nutrient Load; Sediment Load; Temperature; Pharmaceuticals/Contaminants)
WGCP	Pollution	Excess Energy	Power generation	Streams and Rivers	Condition (Water Quality: Temperature)
WGCP	Pollution	Agricultural and Forestry Effluents	Runoff	Streams and Rivers	Condition (Water Quality: Nutrient Load; Sediment Load)

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WGCP	Energy Production	Oil & Gas Drilling	Dewatering	Streams and Rivers	Amount (miles); Water Quantity (Flow: Frequency, Timing, Magnitude, Duration, Rate of Change)
WGCP	Transportation	Roads and Railroads	Culverts	Streams and Rivers	Configuration (Connectivity)
WGCP	Transportation	Roads and Railroads	Bridges	Streams and Rivers	Condition (Structure: Substrate Type)
WGCP	Transportation	Utilities and Service Lines	Pipeline crossing	Streams and Rivers	Condition (Structure: Substrate Type)
WGCP	Human Disturbance	Recreational Activities	Physical trampling (ATVs)	Streams and Rivers	Condition (Structure: Channel Morphology; Substrate Type)
WGCP	Climate Change	Temperature Extremes	Increased temperature	Streams and Rivers	Condition (Water Quality: Temperature)
WGCP	Climate Change	Droughts	Lowering groundwater; reduced precipitation	Streams and Rivers	Condition (Water Quality: Temperature; Water Quantity: Flow -Magnitude)
WGCP	Climate Change	Storms & Flooding	Increased flashiness	Streams and Rivers	Condition (Water Quantity: Flow - Frequency, Timing, Magnitude, Duration, Rate of Change; Structure: Substrate Type)
WGCP	Natural System Modification	Dams & Water Management/Use	Presence of a Dam	Streams and Rivers	Configuration (Connectivity); Condition (Water Quality: Temperature; Water Quantity: Flow - Frequency, Timing, Magnitude, Duration, Rate of Change)
WGCP	Problematic Species	Invasive Non-Native	Aquatic vegetation: hyacinth, salvinia, hydrilla	Streams and Rivers	Condition (Water Quality: DO; Water Quantity: Flow - Magnitude, Duration; Structure - Light Intensity)
WGCP	Problematic Species	Invasive Non-Native	Asian Carp	Streams and Rivers	Condition (Structure: Trophic Dynamics)
MAV	Agriculture	Annual and Perennial Non-timber Crops	Loss of natural habitats	Forested Wetlands	Amount (acres); Configuration (Patch Size; Connectivity)
MAV	Biological Resource Use	Logging and Wood Harvesting	Fragmentation due to timber harvest	Forested Wetlands	Amount (acres); Configuration (Patch Size; Connectivity)
MAV	Natural System Modification	Dams & Water Management/Use	Hydrologic alteration	Forested Wetlands	Amount (acres); Condition (Composition)
MAV	Climate Change	Temperature Extremes	Increased temperature	Forested Wetlands	Amount (acres); Configuration (Patch Size; Connectivity); Condition (Structure and Composition)
MAV	Climate Change	Droughts	Increased temperature and changes in precipitation patterns	Forested Wetlands	Amount (acres); Configuration (Patch Size; Connectivity); Condition (Structure and Composition)
MAV	Climate Change	Storms & Flooding	Changes in precipitation patterns	Forested Wetlands	Amount (acres); Configuration (Patch Size; Connectivity); Condition (Structure and Composition)
MAV	Transportation	Utility & Service Lines	Direct Conversion and fragmentation from pipelines and ROWs	Forested Wetlands	Amount (acres); Configuration (Patch Size; Connectivity)
MAV	Climate Change	Temperature Extremes	Increased temperature	Streams and Rivers	Amount (miles); Water Quantity (Flow)
MAV	Climate Change	Droughts	Increased temperature and changes in precipitation patterns	Streams and Rivers	Amount (miles); Water Quantity (Flow)
MAV	Climate Change	Storms & Flooding	Changes in precipitation patterns	Streams and Rivers	Amount (miles); Water Quantity (Flow)
MAV	Pollution	Agricultural and Forestry Effluents	Change in sediment budget (ag and development)	Streams and Rivers	Water Quality (Sediment load)
MAV	Pollution	Industrial and Military Effluents	Change in temperature and increased contaminants	Streams and Rivers	Water Quality (Temperature; Contaminants)
MAV	Pollution	Household Sewage & Urban Wastewater	Change in nutrients, sediments, and contaminants	Streams and Rivers	Water Quality (Nutrients; Sediments; Contaminants)
MAV	Pollution	Excess Energy	Change in temperature from power plant discharge	Streams and Rivers	Water Quality (Temperature)

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MAV	Natural System Modification	Other Ecosystem Modifications	Change in sediment and spoil via levees alters hydrology	Streams and Rivers	Amount (miles); Configuration (Connectivity); Water Quantity (Flow); Water Quality
MAV	Natural System Modification	Dams & Water Management/Use	Hydrologic alteration: channelization and destabilization; head-cutting	Streams and Rivers	Amount (miles); Configuration (Connectivity); Water Quantity (Flow); Water Quality
MAV	Transportation	Shipping Lanes	Direct Conversion: Physical change in stream systems	Streams and Rivers	Amount (miles); Configuration (Connectivity); Condition (Structure)
MAV	Problematic Species	Invasive Non-Native	Asian Carp	Streams and Rivers	Condition (Structure)
MAV	Natural System Modification	Dams & Water Management/Use	Hydrologic alteration: low water table - ag and development	Groundwater	Water Quantity (Recharge Rate)

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