# Conceptual Models for Golden Eagle, Costa's Hummingbird, Loggerhead Shrike, and Gilded Flicker

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# Contents

# Introduction

As part of the contract for predictive modeling for four Clark County bird species, the Great Basin Bird Observatory (GBBO) developed conceptual models for the species Golden Eagle, Costa's Hummingbird, Loggerhead Shrike, and Gilded Flicker to help illustrate their conservation needs in Clark County. The models were based on published literature on these species, as well as our experience with these species in Clark County and elsewhere in Nevada. Three of the species, Golden Eagle, Costa's Hummingbird, and Gilded Flicker, are currently recognized by Partners in Flight as conservation priority species, and GBBO has provided earlier conservation assistance on these in its Nevada Comprehensive Bird Conservation Plan (GBBO 2010).

# Golden Eagle

The Golden Eagle is widespread and relatively common throughout Clark County and Nevada. It nests primarily in cliffs and rock outcroppings (ideally > 70 feet tall, GBBO 2010) and occupies home ranges that cover as much as 60,000 acres of desert lowlands, although these home ranges often overlap. The Golden Eagle's primary food source includes jackrabbits, cottontails, and ground squirrels, which it hunts during diurnal foraging flights over habitat types occupied by its primary prey (Kochert et al. 2002). We suspect that Golden Eagle densities in Clark County are primarily driven by prey densities, and thus, habitat management to preserve Golden Eagle populations is mostly as task of managing lagomorph and large rodent populations. Golden Eagles are facultative scavengers but, based on our experience, scavenging is a less preferred foraging method over hunting for live prey, and it is mainly done during times of low prey availability. Golden Eagles are also sensitive to disturbances of their nest sites, including human intrusions from recreational activities, but also construction of infrastructure and traffic associated with it. They are also prone to collisions and electrocutions from energy facilities, if these structures are not sufficiently equipped to prevent bird mortalities. Figure 1 illustrates the stressors likely present in Clark County and predicted responses of Golden Eagles to them.

# Costa's Hummingbird

Costa's Hummingbirds are associated with blooming shrubs and forbs of the Mojave Desert, and they may particularly rely on those associated with high groundwater tables that allow at least some of them to flower throughout the summer, such as bladderpot, penstemon, cactuses, squaw cabbage, desert willow (Baltosser and Scott 1996, GBBO 2010). While Costa's Hummingbirds are not considered strictly riparian in their habitat use, we find that they are more likely to occur near desert springs and vegetation that is typically associated with water and their highest breeding densities in Clark County were found on survey transects that had at least some lowland riparian vegetation (GBBO 2010). Unlike other hummingbirds, this species is not known to be reliably associated with artificial food sources, such as hummingbird feeders and urban landscaping (Baltosser and Scott 1996). Although average territory sizes are unknown, a typical nesting territory has 3-10 reliably blooming shrubs, but raising a brood also requires access to small invertebrates that are gleaned from shrub foliage or caught on the wing. Figure 2 illustrates the stressors likely present in Clark County and predicted responses of Costa's Hummingbirds to them.

# Loggerhead Shrike

Loggerhead Shrikes are a species of the open desert and steppe environments, and they are found in most habitat types of Clark County except forests and the alpine zone. Loggerhead Shrikes tolerate dry shrub steppe and desert scrub, where they nest in tall, often thorny, shrubs and forage from tall perches on large insects, including grasshoppers, moths, and butterflies, as well as on lizards (Yosef 1996). They occupy large territories (20-60 acres, Yosef 1996), which may be relocated to more suitable areas from year to year, and they are known to follow recent fires that are thought to provide rich foraging opportunities during the nesting season (GBBO, unpubl.). The species' habitat preferences are otherwise difficult to characterize because almost all open habitat types, such as desert scrub, shrubsteppe, open pinyon-juniper, salt desert, and agricultural lands, are commonly used as long as suitable prey populations, tall perches, and tall nesting shrubs are available on the landscape. The species is reportedly often associated with spiny woody plants, and it is only known to avoid densely forested habitat types (Yosef 1996). Figure 3 illustrates the stressors likely present in Clark County and predicted responses of Loggerhead Shrikes to them.

# Gilded Flicker

Gilded Flickers were first recorded as nesting in Nevada by the breeding bird atlas project (Floyd et al. 2007), and they have since been observed during the breeding season in the same and nearby locations in southern Clark County. In Clark County, unlike in most of their global range where they are known to nest in saguaro cactuses and riparian forests, Gilded Flickers are currently exclusively found in mature Joshua tree landscapes of the southern half of the county. This may be a habitat type that they uniquely use in the Mojave Desert and little is known about specific habitat requirements, food habits, territory sizes, and stressors in this environment. Gilded Flickers require tree cavities (DBH 12-20 inches, GBBO 2010), which are provided by Joshua trees, and they forage primarily on the ground and in the desert vegetation for insects (Moore 1995). During the non-breeding season, they also consume fruits and seeds. Historically, Gilded Flickers may have been present in Clark County's lower Colorado River's riparian gallery forests, but since the loss of mature cottonwood and willow trees, no riparian populations have been reported from the lower Colorado River in at least 30 years. None of the other riparian areas in Clark County have ever had Gilded Flicker records. Gilded Flickers reach the northern edge of their global range in Clark County, and it is unknown how far north and west from Clark County their current population extends. In light of climate change models, this species should be monitored for northward movements and increased presence in Clark County. Figure 4 illustrates the stressors likely present in Clark County and predicted responses of Gilded Flickers to them.

# Literature Cited

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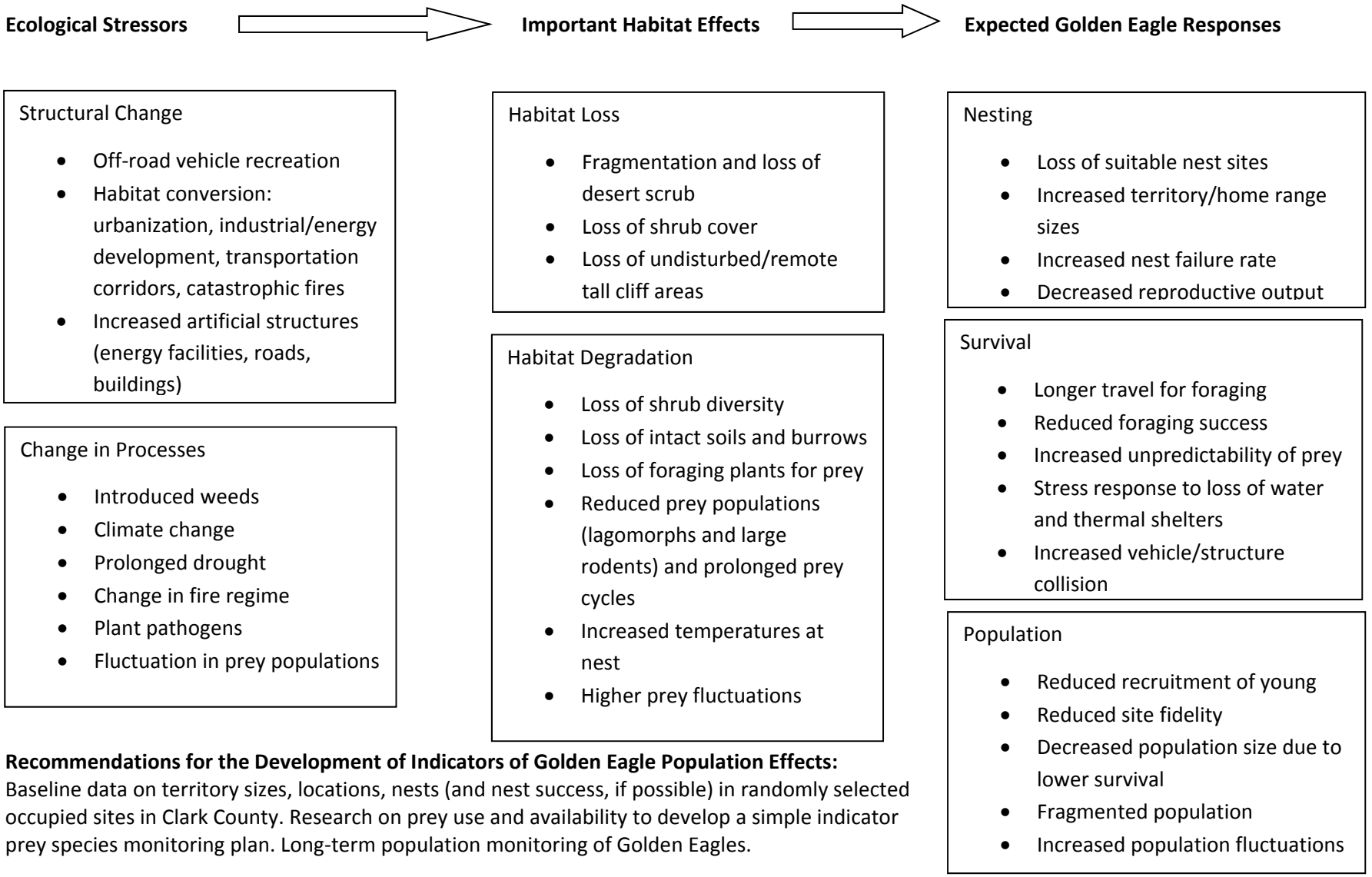
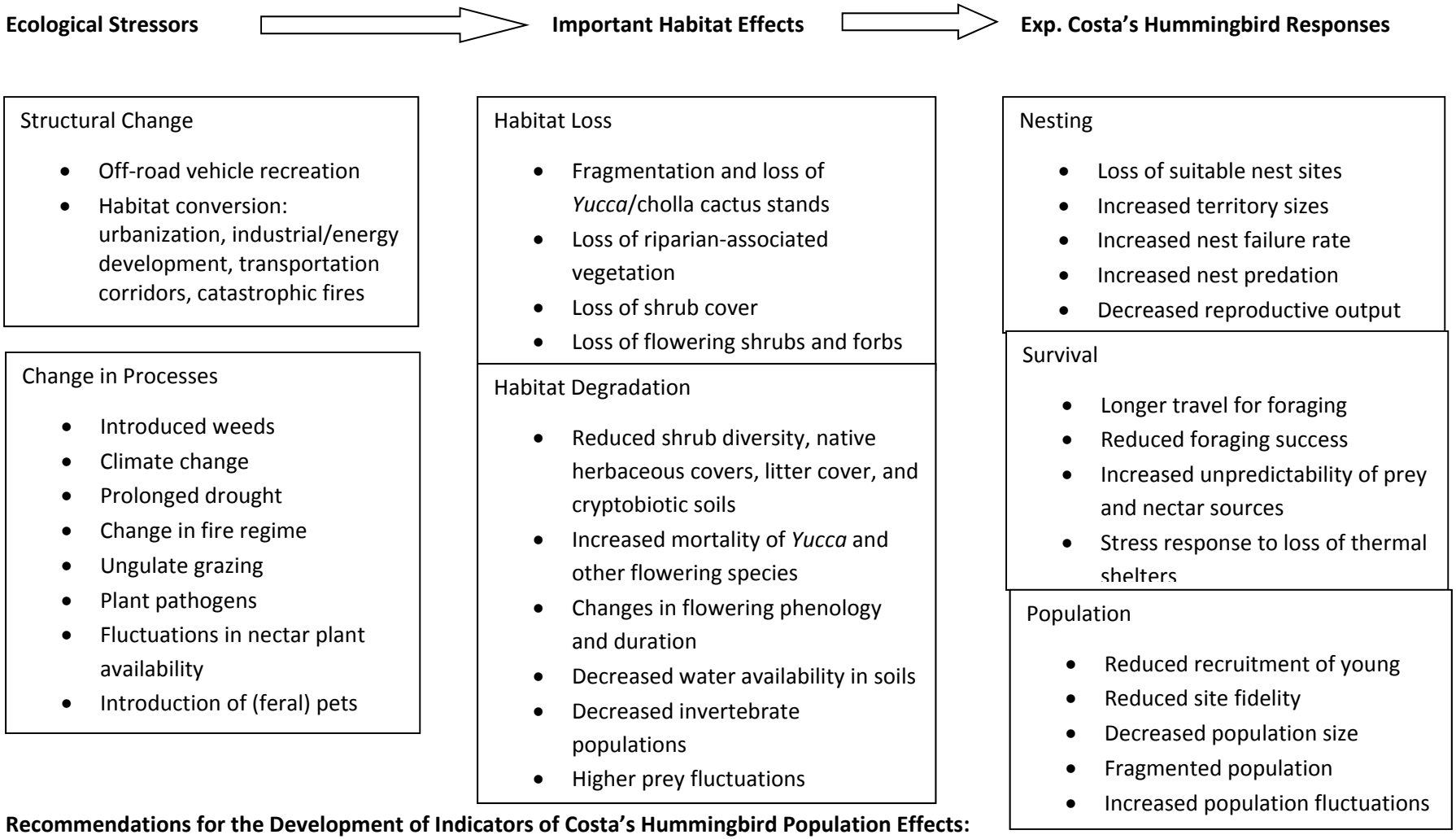
**Figure 1**: Conceptual model of threats to the Golden Eagle (primary breeding habitat of the species is cliffs) in Clark County.



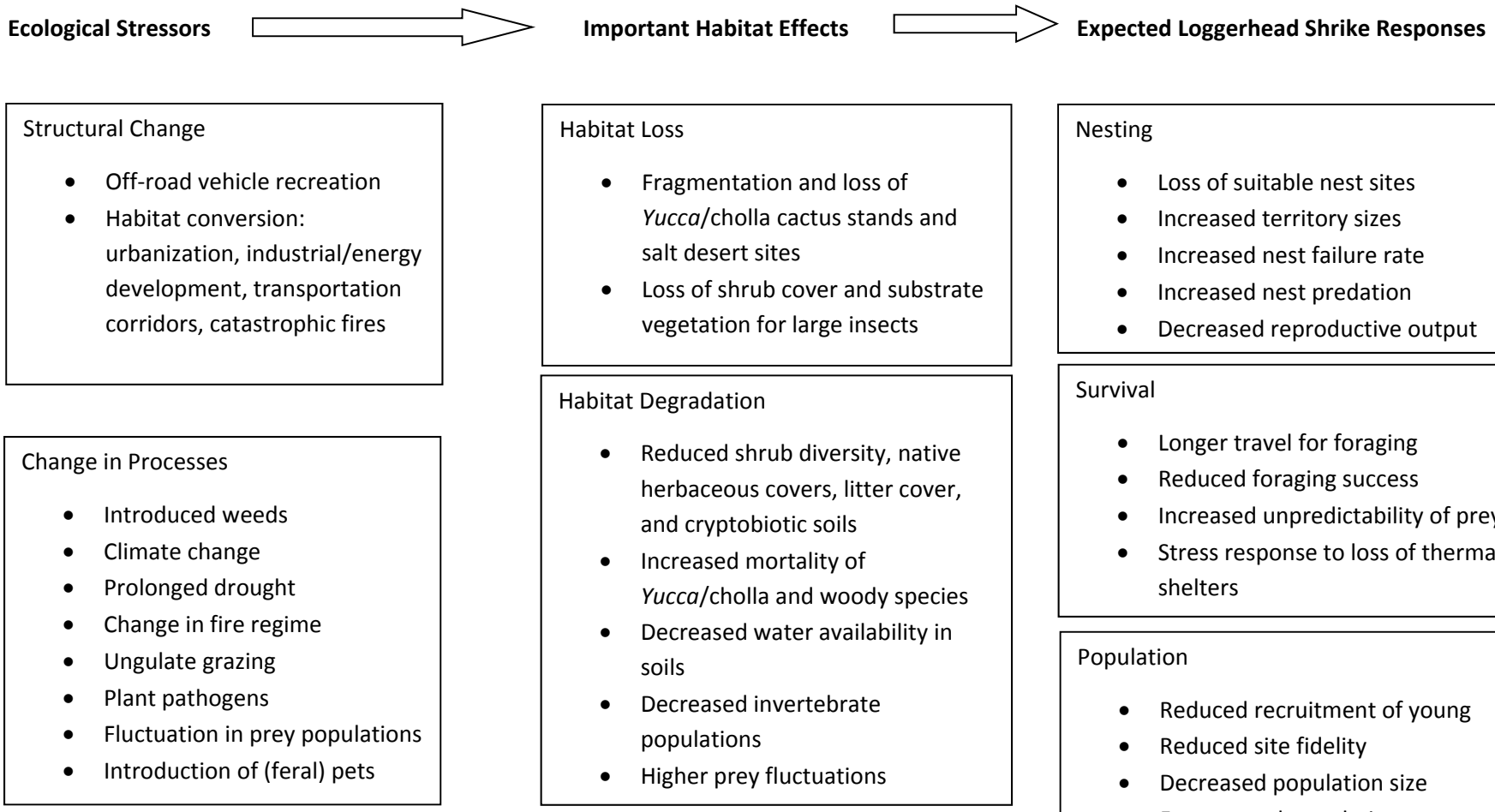

**Recommendations for the Development of Indicators of Golden Eagle Population Effects:**
Baseline data on territory sizes, locations, nests (and nest success, if possible) in randomly selected occupied sites in Clark County. Research on prey use and availability to develop a simple indicator prey species monitoring plan. Long-term population monitoring of Golden Eagles.

**Figure 2**: Conceptual model of threats to the Costa's Hummingbird (primary breeding habitat of the species is *Yucca*/Mojave desert scrub) in Clark County.



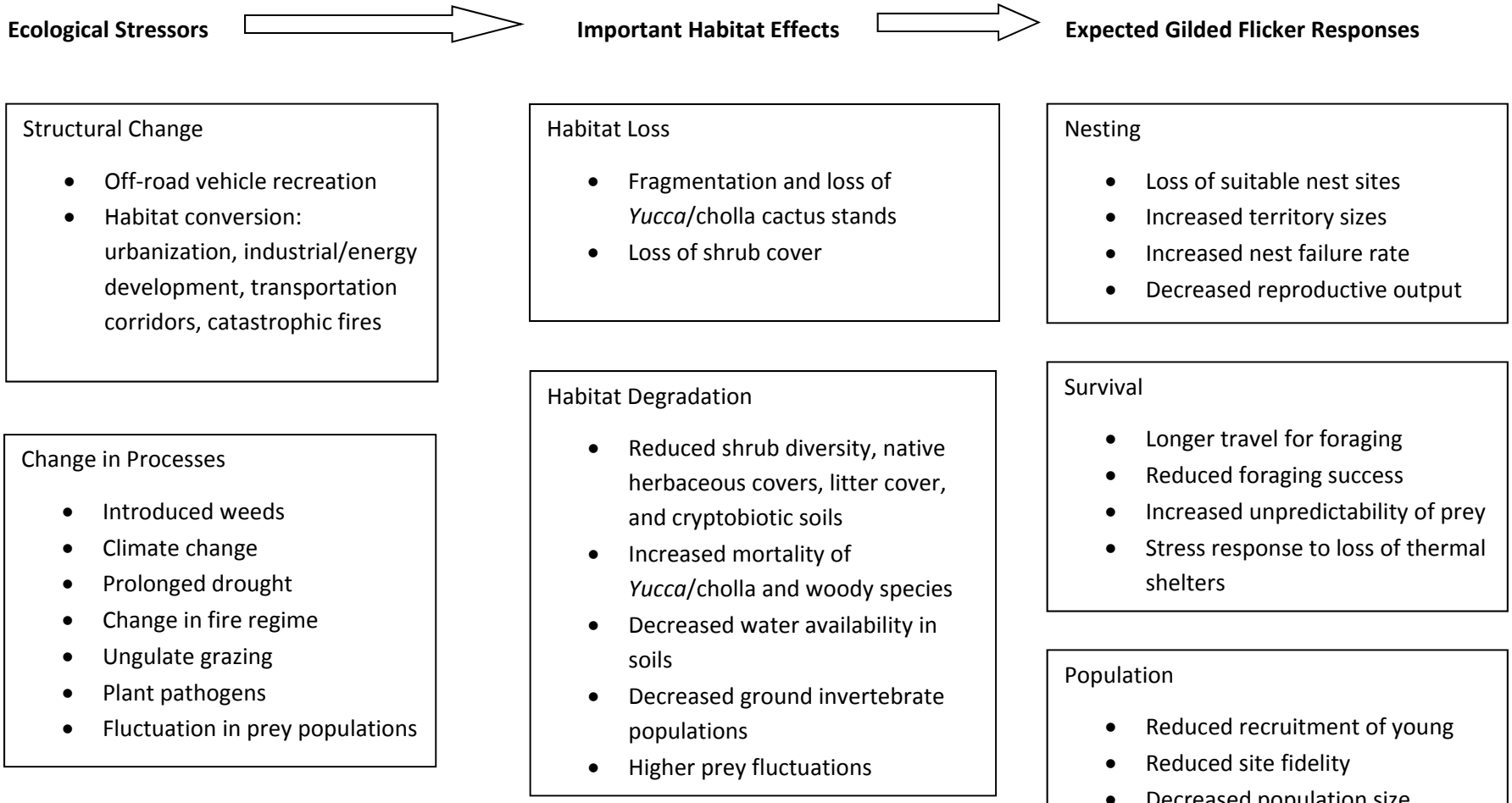

**Recommendations for the Development of Indicators of Costa's Hummingbird Population Effects:** Study of territory sizes, locations, nests (and nest success, if possible) in randomly selected occupied sites in Clark County. Identification of foraging plants. Long-term population monitoring of Costa's Hummingbird.

**Figure 3**: Conceptual model of threats to the Loggerhead Shrike (primary breeding habitats of the species are *Yucca*/Mojave scrub and salt desert) in Clark County.




**Recommendations for the Development of Indicators of Loggerhead Shrike Population Effects:**
Multi-year nest study on territory sizes, locations, nests (and nest success, if possible) in randomly selected occupied sites in Clark County. Study of prey species in Clark County.
Long-term population monitoring of Loggerhead Shrike.

**Figure 4**: Conceptual model of threats to the Gilded Flicker (primary breeding habitats of the species are *Yucca*/Mojave scrub) in Clark County.




**Recommendations for the Development of Indicators of Gilded Flicker Population Effects:**
Multi-year nest study on territory sizes, locations, nests (and nest success, if possible) in randomly selected occupied sites in Clark County. Determination of prey species and other habits in *Yucca* habitats. Long-term population monitoring of Gilded Flicker.