Statement of Estimated Regulatory Costs (SERC) for a Non-native Species Risk Evaluation Rule for the Florida Fish and Wildlife Conservation Commission (FWC) – Final Report

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Executive Summary

The Florida Fish and Wildlife Conservation Commission (FWC) recently contracted with the Florida State University Center for Economic Forecasting and Analysis (FSU CEFA) for an economic analysis of a newly proposed rule. This study conducts a statement of estimated regulatory costs (SERC) to evaluate the risk of nonnative species to Florida.

The overall goal of this economic study is to provide the Florida Fish and Wildlife Conservation Commission (FWC) with an initial Statement of Estimated Regulatory Cost (SERC) for implementing changes to Chapter 68-5 F.A.C, according to the SERC process outlined in 120.541 Florida Statutes.[1] This rule is intended to prevent the introduction and establishment of new nonnative fish and wildlife by using a developed risk evaluation method to evaluate whether these species pose little or no threat to Florida. FWC is seeking to develop a SERC at the beginning of the rule making process to better understand the economic impacts to small businesses that may be affected by a change in the importation allowances and risk determination process for nonnative fish and wildlife species. In addition to the expected costs to the FWC, the specific considerations of this SERC, in addition to the processes laid out in statute, can be separated into three parts. These pertain to the impacts to licensed commercial sellers of nonnative fish and wildlife in Florida, including but not limited to pet stores, aquarium stores, aquaculture, and public exhibitors:

1) Costs to small businesses in Florida;
2) Costs to small towns in Florida;
3) Costs to small counties in Florida.

[1] Statute 150.541 see: https://www.flsenate.gov/laws/statutes/2018/120.541

The results of the analysis show that the average costs relating to the above categories. Using risk analyses, the research team found that the total average cost to businesses in Florida are:

- **$1.70 Million** to small businesses;
- **$173K** to small towns;
- **$126K** to small counties.

According to the conditions of the SERC in line with Florida Statutes, the total risk costs of the implementation of the nonnative species rule is greater than $200K in one year, and greater than $1M in the 5-year aggregate and therefore can be further evaluated.

Background

The Florida Fish and Wildlife Conservation Commission (FWC) contracted with the Florida State University Center for Economic Forecasting and Analysis (FSU CEFA) to conduct a statement of estimated regulatory costs (SERC) for the FWC newly proposed rule concepts on the risk evaluation of nonnative species in Florida. Currently, many nonnative species enter the state daily without proper importation permitting. Further understanding is critical given the risk to local businesses as well as the environmental impacts of these species' introduction and establishment. Therefore, FWC has proposed a rule that will evaluate the risk of introducing a nonnative species but requires an understanding of the costs of these regulations. The proposed SERC performed by FSU CEFA is according to the guidelines as are laid out in 120.541 Florida Statute, including the following[2]:

1. **An economic analysis of the direct and indirect effects of the rule.** This includes whether the proposed rule has an adverse impact on economic growth, private sector job creation or employment, or private sector investment; an adverse impact on the business competitiveness, productivity, or innovation; or is likely to increase regulatory costs, including transactional costs, all of which are measured more than $1 million aggregated within 5 years after the implementation of the rule.

2. **Good faith estimates.** This includes an estimate of the total number of individuals and entities likely to be required to comply with the rule, together with a general description; an estimate of the cost to the agency, as well as any state or government entities, of implementing or enforcing the proposed rule, as well the anticipated effect on state revenue; and an estimate of the transactional costs likely to be incurred by individuals and entities required to comply with the rule.

[2] Chapter 120 Section 541 - 2021 Florida Statutes - The Florida Senate (flsenate.gov)

3. **An analysis of the impact on small businesses according to 288.703 Florida Statute[3], and an analysis of the small counties and small cities according to 120.52 Florida Statute.** This includes the decision of the agency not to implement alternatives for the implementation of the rule which would mitigate costs to small businesses. ""Small business" means an independently owned and operated business concern that employs 200 or fewer permanent full-time employees and that, together with its affiliates, has a net worth of not more than $5 million or any firm based in this state which has a Small Business Administration 8(a) certification. As applicable to sole proprietorships, the $5 million net worth requirement shall include both personal and business investments." ""Small city" means any municipality that has an unincorporated population of 10,000 or less according to the most recent decennial census." ""Small county" means any county that has an unincorporated population of 75,000 or less according to the most recent decennial census."

Proposed Rule Concepts

The rule concepts proposed by the FWC concerns the introduction and establishment of nonnative species. While Florida is currently home to over 500 established nonnative species,[4] the door is open for the introduction and establishment of several species that have not been properly evaluated for their risk to the surrounding environment as well as the impact of the species on local businesses. The proposed rule concepts by FWC are to establish a nonnative species risk evaluation process that will potentially prevent the introduction of high-risk species into the state. This rule concept is proposed under two potential scenarios.

1. **Apply rule to nonnative fish and wildlife species not documented in commerce in Florida.** This option of the rule applies to nonnative fish and wildlife species not documented in commerce in Florida and restricts the importation of any new undocumented species. Importation authorization for new species would not be issued until the FWC determines the species poses

[3] Chapter 288 Section 703 - 2021 Florida Statutes - The Florida Senate (flsenate.gov)
[4] Florida's Nonnative Fish and Wildlife | FWC (myfwc.com)

an acceptable level of risk to Florida. If a species is not documented as in commerce, stakeholders may submit to the FWC receipts, bills of landing, or governmental documents showing sustained history of sales. Species currently in commerce in Florida maintain regulatory status quo unless future risk determination necessitates reclassification.

2. **Apply rule to nonnative fish and wildlife species that FWC has not evaluated for risk in Florida and FWC has determined are not sufficiently regulated.** This restricts importation of any unevaluated nonnative fish and wildlife species, so importation authorization for unevaluated species would not be issued until the FWC determines the species poses an acceptable level of risk to Florida. Evaluated species maintaining regulatory status quo for importation are limited to Conditional, Prohibited, Class I and II. Current Class III wildlife and other fish and wildlife not listed as Conditional, Prohibited, Class I or II, could not be imported into Florida without a completed risk determination indicating acceptable level of risk.

With the two scenarios for the draft rule in mind, for this specific SERC, CEFA is tasked with evaluating the regulatory costs of the proposed rule concepts with the following objectives:

1. Impacts to licensed commercial sellers of nonnative fish and wildlife in Florida, including but not limited to pet stores, aquarium stores, aquaculture, and public exhibitors;
2. Cost of risk analyses for petitioners;
3. Cost of risk determination to the FWC.

Literature Review

The following is a literature review concerning economic research of invasive and non-native species. Included in this literature review section is a discussion of invasive-related economic models, risk assessment schemes, and regulatory cost analyses.

Global

At the international level, environmental economic research relating to non-native and invasive species has focused on global and regional costs. Risk assessment schemes have been analyzed in a similar manner. At the global level, Diagne et al., (2021) utilized the InvaCost database to estimate the global cost of biological invasions. For years 1970-2017, the authors found that the globally minimum reported cost was $1.288 trillion. Clout (2002) estimated the ecological and economic costs of invasive vertebrates in New Zealand. The author focused specifically on invasive rat, dog, and bird populations. The total estimated cost of invasive vertebrates in New Zealand was estimated to be $270 million NZ. Colautti et al., (2006) analyzed the characteristics and projected costs of invasive species in Canada. Economic costs were estimated using a combination of case studies and an empirical model. The authors found that ten invasive species were associated with more than $187 million CDN in economic damages annually. Along with these species, and on an annual basis, 16 other invasive species were estimated to cause between $13.3 and $34.5 billion CDN.

In European countries, a number of studies have examined the regional cost of invasive species. Kourantidou et al., (2021) looked at how invasive species have negatively economically impacted the Mediterranean basin. Correlates of costs from invasive damages and management expenditures were identified to estimate the total invasion cost in the basin. The authors estimated that invasive species were responsible for $27.3 billion of damages in the region, and that this number had significantly grown between 1990 – 2017. Angulo et al., (2021) estimated the economic costs of invasive species in Spain. Data from InvaCost, regional governments, and national authorities was gathered to create greater than 3,000 cost estimates. The authors found that the total economic costs were estimated

to be $261 million from years 1997 – 2022. Notably, most of the reported costs were found to be management costs, not damage costs. Haubrock et al., (2021) examined the recorded economic costs of invasive species in Italy. The InvaCost database was utilized to quantify the costs more accurately, due to the lack of government data. The more than 3000 invasive species in Italy accounted for $819.76 million in invasion damages from 1990 – 2020. This number was driven primarily by terrestrial invasive species. Haubrock et al., (2021a) used a similar methodology to understand the economic costs of invasive species in Germany. Of the 181 invasive species present in the country, only 28 had recorded economic costs. These economic costs were estimated to be $9.8 billion between years 1960 – 2020. In addition, there was also $8.9 billion in potential costs that were linked to a few invasive species. Haubrock et al., (2021b) examined the continent-wide costs of invasive species in Europe with emphasis on the distribution of costs, socioeconomic sectors, and taxonomic groups. The total cost of invasive species was estimated to be $140.20 billion between 1960 – 2020, with the majority being damage related. Most costs occurred in large western and central European nations. The authors also noted that costs had accelerated throughout the last few decades and had become substantially more costly.

Along with estimating the costs of invasive species, research has evaluated risk assessment schemes. Keller et al., (2007) developed a cost-benefit bioeconomic framework to estimate the net benefits of pre-screening species. The model was tested on the Australian plant quarantine program using a range of time horizons (10-500 years). The authors found that the risk assessment program produced net economic benefits over the time horizons. They also note that the benefits were most likely undercounted due to low estimates of financial damage caused by invasive species. Gallardo and Aldridge (2013) estimated the risk of establishment in Great Britain of 16 Ponto-Caspian aquatic species. An integrated risk assessment using climate suitability maps, migration distribution, and regression modeling was utilized. The authors found that southeast England was the most vulnerable to invasions due to the proximity of many river basins. This article highlighted the use of integrated risk assessments and risk maps as potential tools for environmental managers when it comes to predicting the risk of establishment. Wan et al., (2021) performed a risk assessment of ship ballast water invasions in a number of ports throughout China. Discarded ship ballast water

provided the perfect pathway for invasive species to spread throughout ports in China. The authors examined how risk could be reduced by implementing international regulations on ballast water and sediments in China. They found that disinfection of ballast water, even at low levels, significantly decreased the level of invasion risk throughout ports. This article highlights the usefulness of international standards for preventing and understanding the risk of establishment for invasive species. Park et al., (2022) created a risk assessment scheme for the invasive American Bullfrog in South Korea. Home range, preferred habitat, morphology, behavior, and ecology were all estimated. These environmental factors were then used to understand how native anurans would be impacted. The authors found that 84% of native anurans were at moderate to extreme risk levels.

Researchers have also developed risk assessment schemes that can be used for entire continents. Chown et al, (2012) created a continent-wide risk assessment scheme for nonnative species in Antarctica. Plant species brought to Antarctica by tourists between 2007-2008 were sampled. This sampling, combined with modeled climates, was used to estimate the likelihood of nonnative species becoming established. The authors found that climate change will increase the risks of establishment and will enable more nonnative species to become invasive. This article is unique due to the continent-wide climate modeling that was used to understand how every region may be impacted in the future by nonnative species. Srebaliene et al., (2019) conducted a comparative analysis of two risk assessment frameworks that are used throughout the world. The two risk assessment frameworks were the international Ballast Water Management Convention (BWMC) and the European Regulation on Invasive Alien Species (IAS). The authors sought to create a common risk assessment procedure that could be utilized anywhere in the world. Their risk assessment included a scoring scheme and economic modeling that would accurately reflect the impact of invasive species on human health and the environment.

When discussing risk assessment schemes, it is important to have an understanding of the literature dealing with regulatory costs. At the international level, regulatory costs are produced and analyzed by a number of governmental bodies. Two such bodies are the European Union and the European Parliament. Recently, the European Union finalized reporting rules for international Environmental, Social and Governance (ESG) programs.

Within these rules, the European Union laid out a variety of costs that firms and local economies may incur as a result of the rule change. A methodology for calculating transaction costs was also produced (European Union, 2023). The European Union also released cost estimate methodologies for recent rule changes relating to the aluminum industry. Within the study, the EU estimated the total cost of the new rule changes and how they would impact the competitiveness of European firms (European Union, n.d.). The study focused on three different types of regulatory costs that impact firms: administrative costs, compliance costs, and indirect costs. Using these three categories of costs, the study then provided a general methodology that can be used by European firms. The European Parliament also provides cost estimates for rule changes in its legislation. European Parliament (2021) identified some of the potential regulatory costs that may occur following the addition of new regulations for investing. The legislation laid out how firms and local economies may been impacted by such changes. European Parliament (2022) used a similar methodology to understand the potential regulatory costs of sustainable batteries.

National

At the national level, environmental and economic research has focused on estimating the cost and benefits of non-native and invasive species. Within this literature, risk assessment schemes are also evaluated. A number of different methodologies have been developed in the literature for estimating costs and benefits. Pimentel et al., (2000) assessed the magnitude of environmental and economic costs associated with invasive species in the United States. The authors developed a comprehensive list of invasive animal species to better understand where most of the cost occurred. Using this list, the authors then surveyed literature and aggregated cost estimates from throughout the decades. Along with cost, the authors also highlighted the fact that a small amount of invasive species can cause a great amount of damage. The total environmental damage from the approximately 50,000 invasive species in the United States was estimated to be $137 billion per year. To better understand the total cost, research has examined the economics of specific invasive species, such as terrestrial and aquatic organisms. Olson (2006) reviewed the literature on the economics of invasive terrestrial species management. Within the review, a number of papers that assigned economic values to the impact of invasive terrestrial species in the United States

were discussed. These papers include (Hoddle et al., 2003), (Pimentel et al., 2005) and (Barbier and Shogren, 2007).

Hoddle et al., (2003) developed a welfare loss model to study the economic impact of avocado pests in California. The authors found that if an avocado pest was to become established, there would be an estimated welfare loss of $4.6 – $7.6 million, along with a 3% increase in industry costs. Pimentel et al., (2005) decomposed the economic costs of specific invasive terrestrial species. The authors found that in the United States, invasive plants accounted for $34.5 billion in damage, invasive animals accounted for $59.4 billion, and invasive microbial accounted for $39.7 billion. This resulted in a total estimated cost of $133.6 billion among the three types of terrestrial species. Barbier and Shogren (2007) developed a unique endogenous growth model in which invasive species were a function of capital stock. This model was utilized to estimate a "biological pollution" externality effect on balanced growth paths. Outside of modeling, attention has been given to the cost of managing invasive terrestrial species. Fischer et al., (2020) examined an Illinois state-wide pig damage management program that involved local, state, and federal cooperation. Surveillance data from camera traps and bait sites was used to understand the factors that optimized removal. The authors found that the average cost for removing 99 percent of the pigs was $50/pig, while the cost of removing the last one percent, increased 84-fold. This article highlights the complexity and cost constraints surrounding invasive species management programs in the United States. Within a vertebrate invasive species damage model, Shwiff et al., (2020) noted that the management costs are significant and should be accounted for in damage estimates.

Similar research has been done on the economic impact of invasive and non-native aquatic species. Moyle and Stompe (2022) identified a number of characteristics of non-native aquatic species in estuarine habitats. The authors found that estuaries that have been heavily modified by human activity are most likely to support non-native fish. They also note that non-native aquatic species within estuarine habitats do not always become invasive. Lovell et al., (2016) conducted a literature review on the economic impacts of invasive aquatic species. Within the review, a number of articles relevant at the national level were discussed. These articles include (Settle and Shogren, 2002) and (Lupi et al., 2003). Settle and Shogren

(2002) developed a bioeconomic model of native cutthroat trout and their interaction with invasive lake trout in Yellowstone Lake. Using this model, the authors estimated the total cost for an optimal lake trout control program, which was $173,000 at the time. Lupi et al., (2003) utilized a random utility model of recreational fishing to estimate the benefits of invasive lamprey control. The model was developed using data from recreational fishing in Michigan for the 1994-1995 season. Annually, the authors found that the benefits of lamprey control for anglers along the St. Mary's River ranged between $3.2 million to $5.8 million.

Along with cost estimation, risk assessment schemes have also been evaluated in the literature. Risk assessment schemes are used to understand what environments most at risk to invasive species are, and which invasive species pose a threat. Keller et al., (2007) created a predictive occurrence model for rusty crayfish to understand which Vilas County, Wisconsin lakes were most likely to be invaded. The occurrence model was nested inside an economic model to determine whether or not targeted management would increase the value of the lakes. The authors found that the optimum expenditure on lake protection would produce economic benefits of $6 million over 30 years. This article highlights the economic benefits of predictive environmental risk assessments. Kaiser and Burnet (2010) developed a spatial-dynamic model for early detection and rapid response to invasive species. The model was applied to Brown tree snakes in Oahu, Hawaii. A number of different preventative search strategies were tested. The authors found that early and aggressive measures that search high priority areas can save the island more than $295 million over 30 years. Gordon et al., (2011) utilized the Australian Weed Risk Assessment system to evaluate the invasive potential of twelve bioenergy crops in Florida. The authors found that the risk assessment correctly identified invaders 90% of the time, and non-invaders 70% of the time. When scaled to the rest of the United States, prediction percentages were similar. The authors noted that the success of the risk assessment minimized the economic costs of invasive species throughout the United States. This is a common finding in environmental economic literature. Jenkins (2013) reviewed Federal government policy towards invasive species, focusing on the Lacey Act. The author juxtaposed government policy with recent environmental economic research that highlighted the high costs of invasive species. The author recommended that to accrue economic benefits, the federal government needed to

fund a proactive risk assessment program. Leung et al., (2014) created a risk assessment model that focused on pathways of introduction for invasive species. A pathway-level international phytosanitary policy for treatment of wood packaging material was utilized. The authors found that delaying the arrival of new invasive species resulted in substantial economic benefits. Also, policy implementation could generate cumulative economic benefits for decades.

It is also important to understand the literature dealing with regulatory costs for such policies. In the United States, federal agencies routinely estimate the potential regulatory costs from rule changes. One agency that does this often is the Environmental Protection Agency (EPA). On three occasions recently, the EPA has released cost estimations for regulatory changes. The EPA has produced Cost Reports and Guidance for Air Pollution Regulations. This report contains cost estimation methodologies that enable those being regulated to understand the costs they will incur. Firms and government officials can use this report to understand how the energy economy may be affected by such rule changes (Environmental Protection Agency, 2021). The EPA has also released a National Cost Analysis for Drinking Water Regulations. In this document, the EPA defines the cost of regulatory action and provides methodologies for estimating regulatory costs (Environmental Protection Agency, 2023). A similar document is available for Cost Estimates of Studies Required for Pesticide Registration (Environmental Protection Agency, 2022).

State - Florida

At the state level, environmental and economic research has examined the impact of non-native and invasive species. Most studies have focused directly on the environmental impact, while others have analyzed risk assessment schemes and the parties involved. To better understand the environmental impact, researchers have focused on the establishment and life-cycle behavior of non-native species. Understanding these processes is important for formulating regulations relating to non-native species.

Semmens et al., (2004) studied hot-spots of non-native species and their sources in the state of Florida. A large spatial marine fish database was used to identify where in Florida non-native fish were establishing themselves. The authors found that there was a large number

of non-native fish clustered around reefs of Southeast Florida. The likely invasion sources were ballast-water exchange and aquarium release. Further research highlighted the states aquaculture production, abundant water, and warm climate as aiding establishment (Hill 2006). The role of land use and urban design has also been examined to understand establishment. Forys and Allen (2005) looked at how urban sprawl impacted biodiversity among non-native and native species in the Florida Keys. A data set of native and non-native ant species in the urbanized Florida Keys was used. The authors found that if development continues in the region, the number of non-native ants may dramatically increase. This article highlights the role that the built environment plays in Florida when it comes to aiding non-native species establishment. Clements et al., (2019) also examined the role that built environment plays in helping establish non-native species. Surveys for reptiles and amphibians in 15 pairs of native/non-native parks were conducted. The authors found that land use significantly reduced native biodiversity and allowed non-native species to flourish in the area. The Florida State University Center for Economic Forecasting and Analysis (FSU CEFA, 2016) conducted an economic analysis study of the Panama City Crayfish (PCC) habitat range for the Florida Fish and Wildlife Conservation Commission (FFWCC). The methodology examined the reallocation of urban land for PCC habitat use. Relocation results in economic value determination, something the study team focused on extensively. They estimated the minimum total integral cost of re-allocation for one urban acre to one rural acre to be approximately $140,000 in direct parcel purchase costs. Using this figure, the team found about 1,000 acres of optimal cost points. They also estimated the mean value per agricultural acre in the PCC habitat range. Land in the eastern area was valued at $8,310 per acre, while land in the western acre was valued at $9,978 per acre. It was also noted that the economic valuation analysis depended heavily on the real estate market conditions.

Lawson and Hill (2021) used life history traits of non-native species to predict the risk of establishment in a region. The authors conducted a factor analysis that evaluated 21 life history traits for 125 fishes in three different groups: native, established non-native, and non-established. The authors found that successfully established species invested heavily in their offspring and tended to be larger bodied. This article highlights the feasibility and

effectiveness of factor analysis when it comes to analyzing the risk of non-native species establishment.

Along with environmental impact, research has also examined environmental risk assessments for non-native species in the state. This research highlights different risk assessment frameworks that have been utilized, and the different stakeholders involved. Hardin and Hill (2012) carried out a risk assessment of Barramundi Perch aquaculture in Florida. The risk assessment brought together a number of different stakeholders to fully understand the effects of any regulations. The authors found that the stakeholder meetings were constructive and led to beneficial revisions in risk estimates. Further research has highlighted the importance of stakeholder involvement when it comes to getting every party involved to recognize non-native species as an issue. Espicopoio – Sturgeon and Pienaar (2018) collected stakeholder opinions about the pet trade invasion risk in Florida. The authors found that key stakeholders framed the effectiveness of regulations in terms of feasibility, and that there existed a lack of trust among stakeholders. These issues were identified as major barriers to managing the pet trade invasion risk.

Research involving state environmental regulations and how they are perceived by stakeholders is also relevant. Alberini (2001) examined environmental regulations relating to storage tanks and the response by firms. Longitudinal county level tank data was used to understand substitution and complementary effects. The author found an association between educational attainment and damage calculus for firms, indicating that such aggressive regulatory policies can be effective given the education of firm owners. Tuckett et al., (2016) looked at how best management practices (BMPs) in aquaculture have been implemented in the state. Working with the Florida Department of Agriculture and Consumer Services (FDACS), site visits to numerous aquaculture operations were carried out. The authors found that noncompliance issues were mainly minor and were quickly remedied. A relationship between size of facility and noncompliance was also noted. This article suggests that transparent environmental regulations with routine inspection minimize noncompliance in aquaculture and prevent the release of nonnative species. Such a framework may be applicable to risk assessments for non-native species in aquaculture. Pate et al., (2021) analyzed opinions among recreational anglers in the state relating to

manta ray conservation. Anglers were surveyed at piers and inlet jetties in Palm Beach County. The authors found that 98% of those surveyed supported environmental protection regulations, and 82.3% supported conservation efforts. This result suggests that those who utilize public goods, such as fisheries, support efficient regulation to maintain them. Zacharias and Kaplan (2023) reviewed the past, present, and potential future of phosphorus management in the Florida Everglades. One issue they focused on specifically was balancing the priorities and values of a diverse group of stakeholders. The authors found that under such regulations, not all stakeholders can achieve 100 % of what they want. Instead, they need to make concessions to meet system-level goals. This article highlights the complexity of balancing numerous stakeholder values in the regulatory process, something that is extremely relevant for risk management and assessment. Wester and Macdonald (2023) examined how key stakeholders perceived environmental problems and solutions in the state. A large online survey (n = 829) was conducted to capture Floridians' diverse perceptions on the topic. The authors found that environmental problems were considered important and support for pro-environmental policies was high. They also found that the intersection of social identities and ideological attitudes played a significant role in shaping perceptions. This suggests that support for any given environmental regulation depends heavily on the interests and ideology of a specific stakeholder group.

The literature covering the Statements of Estimated Regulatory Costs (SERCs) in the state has also been extensive. Under Florida Statue 120.541, state agencies are required to document how rule changes will impact local economies. More specifically, economic growth, private sector job creation, and private sector investment in excess of $1 million. The methodologies for conducting SERCs vary by agency in the state. For example, the Florida Agency for Health Care Administration SERCs discuss rule changes specifically and explain how, based on a number of state statues, the rule change will not have any adverse economic impacts (Agency for Health Care Administration, n.d.). Other agencies, such as the Agency for Persons with Disabilities and the Department of Education, use a similar methodology for their SERCs. The Department of Environmental Protection provides calculations, statistics, and statues for their SERCs (Department of Environmental Protection, n.d.). This allows individuals to better understand how rule changes may impact local economies, depending

on the available data. At the local level, SERC methodologies are very similar to those used by state agencies. The South Florida Water Management District conducted a SERC on a rule revision relating to basin criteria. Similar to the Department of Environmental Protection, the SERC relied on statistics, calculations, and state statutes to reach a conclusion (South Florida Water Management District, 2011). Harrington et al., (2012) conducted a cost estimation for rule changes relating to Numeric Nutrient Criteria in Florida. Regulatory costs were broken down into 3 categories: Low, high, and median cost. The authors found that reclassification of water bodies would result in higher implementation costs, depending on the category of water body. Hazen and Sawyer (2021) conducted a SERC for rule changes to the Central Florida Water Initiative. The authors provided statistics and economic modeling to quantify the economic impact of the rule changes on the local economy. Overall, SERC methodologies are quite standardized and depend specifically on the agencies conducting rule changes.

Methodology and Data

Methodology

In order to complete a Statement of Estimated Regulatory Costs for this analysis of the impact of the nonnative species rule concepts, the research team utilized risk tools to calculate the total costs to small businesses, small towns, and small counties in the state of Florida. This analysis is specifically a risk assessment of the total costs to the small businesses, small towns, and small counties that will comply with the proposed rule.

For this analysis, the research team used the statistical risk analysis tool, @RISK.[5] This tool is a statistical package that allows one to run cost-benefit analysis with preset-parameters for the distributions of the analysis. With this tool, the team was able to run risk analyses for each of the intended results on businesses, towns, and counties while considering the average, low, and high costs of the implemented rule concepts. The assumptions as well as the acquisition of data used for this analysis are illustrated below.

Assumptions

For this analysis, several assumptions are made concerning the nature of the proposed rule concepts and its expected adverse impacts or other effects.

Assumption 1

The first assumption is the types of businesses that will be impacted by implementation of proposed nonnative species rule concepts. While there are possible environmental and further economic effects of regulating the introduction and establishment of nonnative species, particularly for high-risk species that may require future eradication, the businesses that are examined in this analysis include those that fall under the general direct impact of the rule concepts. This will include industries such as stores that sell nonnative species, breeders, commercial fishers for nonnative species, aquariums, aquaculturists, or any other

[5] https://lumivero.com/products/at-risk/

business involved in acquiring or importing, distributing, or maintaining nonnative species in Florida.

In addition to this specification of the types of industries, the team assumes the businesses affected are those only located in Florida as the rule concepts will not be applicable to regions outside of the state. This entails businesses listed directly in the state are the only ones to experience the direct impacts. Therefore, the research team only examines specified industries that will be directly affected by the nonnative species rule concepts, evaluated for companies in Florida.

Assumption 2

The second assumption made by the research team is the total number of species applications expected to be submitted to the FWC for evaluation in one year following the implementation of the rule. Considering the originality of this rule concept, as no other state in the region regulates nonnative species for risk evaluation, and the uniqueness of Florida regarding the number of nonnative species brought into the state every year, the expected number of total applications of nonnative species for risk evaluation is unknown. However, the estimated number of applications was necessary for the purpose of an estimation of costs to small businesses, small towns, and small counties in Florida. Therefore, the research team estimated the low, median, and high number of application costs based on the number of nonnative species present in the state, the total businesses likely to comply, and the capacity of the FWC staff to complete the total submitted risk evaluations.

Currently, the state spends an average of $100 million on the eradication of nonnative species of plants, and approximately $500 million annually in containing invasive species and addressing their respective damages.[6] There are over 500 species currently documented by the FWC as nonnative species that have been found in the state of Florida.[7] Therefore, the expected number of species submitted per year is not expected to exceed the total number of species already found in the state and therefore the high number of applications submitted

[6] Report Invasive Species - Fish & Wildlife Foundation of Florida (wildlifeflorida.org)

[7] According to the official FWC website, there are currently 545 documented nonnative fish and wildlife species either reported, established, or extirpated in Florida: https://myfwc.com/wildlifehabitats/nonnatives/

in a year is estimated as 500 by the research team. For the low number of total applications submitted in a year, the team estimates that there are at least 10 applications submitted, with the average at around 55, which accounts for at least 10 percent of the high number.

The application number estimated for the costs to small towns and small counties are proportions of these estimates. For purposes of this analysis, for small businesses, the expected number of applications in one year range from 10 to 500, with an average of 55.

Assumption 3

The last assumption, and concurrent with the estimation(s) discussed above, involves the individual costs to a company required to comply with the nonnative species' rule concepts. All companies that manage the selling or distribution of nonnative species will be required to comply with the rule concepts if they plan to introduce a new species to the state. However, these businesses are not expected to necessarily possess the required staff that would be essential in carrying out the species application. Considering the application requires a detailed bioprofile of the proposed species as well as an extensive literature review into the species, the staff necessary to complete this application would require a hired biologist or, more likely, outsourcing the application to a research or biological facility.

While the application to the FWC incurs no actual fee, the cost to the businesses for compliance with the nonnative species rule concepts includes the cost of completing the application, and therefore the costs of typically hiring a source to complete the application.

In order to calculate this cost per business, the research team used the average hourly rate of a biologist as well as their required time to complete the application. These costs to a business can be estimated through the direct cost of the specific biospecies profile itself, as well as looking at the total direct and indirect costs to a business providing a biospecies profile which includes the time and salaries devoted to proposing and developing the application project. While the direct costs incurred may be lower, the research team assumes slightly overall higher costs, as the types of companies affected by the implementation of the nonnative species rule vary to the degree of resources available in developing a research team, in addition to the total direct costs of the biospecies profile.

Assuming that a business does not possess the necessary staff and will need to outsource to another facility, the average cost of a biologist in the United States in 2022 is $46.38/hr.[8] Assuming the average length of time required to complete an application is 12 weeks working at full time, the expected average cost to any businesses in compliance with the proposed rule is estimated at $22,262.[9] For the low costs, the expected cost is half of the average cost as some small businesses may either already have an existing staff member or only need to dedicate a portion of their staff's time to completing an application. Therefore, the low cost in estimated at $11,131.[10] Thirdly, the high cost to a business is for those that directly hire a full-time biologist to their staff. While outsourcing is more probable, the high cost expected to be incurred by businesses that hire and pay a full-time biologist is $89,049.[11]

With these assumptions in mind, one can look at the data obtained for the completion of the economic analysis.

Data

The data used in this report comes from several sources. Considering the nature of the analysis, necessary data includes the total sales of businesses in the state of Florida, specifically those businesses which are expected to experience the adverse impact of the nonnative rule concepts insofar as funding their own applications for a species to be evaluated. The source of relevant small business information is obtained from the National Establishment Time-Series Database (NETS), which is a private sector source of U.S. business microdata.[12] NETS provides extensive information on employment, sales growth, and company details of multiple markets in the United States. In part due to the precision of the NETS data, there is a lag in the year of data available. Therefore, the research team uses NETS data from 2020 for the purposes of this analysis.

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[8] https://www.bls.gov/oes/current/oes191029.htm#ind for year 2021 = $46.38

[9] Mathematical calculation of the average cost: $22,262 = $46.38 x (12 x 40)

[10] Mathematical calculation of the low cost: $11,131 = ($46.38 x (12 x 40))/2

[11] Mathematical calculation of the average cost: $89.049 = $46.38 x (48 x 40)

[12] The Fed - An Assessment of the National Establishment Time Series (NETS) Database (federalreserve.gov)

While this data is essential for the identification of companies that would likely be affected by the implementation of the proposed rule, population data is provided by the current population survey. These data are used to identify small cities and counties according to population size, also kept at the 2020 level in line with the 2020 available data from NETS.

Finally, the research team used salaries for the staff that will implement the regulation of the proposed nonnative species rule provided by the FWC. These salaries are used for estimating the regulatory costs to the FWC.

Data Cleaning and Preparation

To prepare the NETS 2020 data for analysis, the team extracted the likely FWC nonnative species-related businesses for Florida. As mentioned earlier in outlining the assumptions of our analysis, these selected industries fall under the general sectors of pet stores, breeding services, and aquaculture. For greater specificity, the exact sectors selected were:

- Fish hatcheries and preserves;
- Commercial Fishing;
- Pets and pet supplies;
- Breeding services, pet, and animal specialties;
- Pet supplies;
- Aquarium;
- Aquarium supplies;
- Animal Services, Except Veterinary, and;
- Animal Specialties (e.g., public exhibitors, etc.)

In order to avoid estimating costs of businesses no longer in operation, the team deleted all businesses that were not in operation in 2020 to limit the sample to currently operating businesses, as well as deleting businesses located and operating out of the state of Florida. Finally, total sales and total employees for the identified businesses are aggregated to produce totals for each industry in Florida. Aggregated sales and employment totals allow

the team to look at the total adverse impacts of the proposed rule as well as the average costs to the individual businesses.

Next, the research team selected population data for the counties and cities of Florida from the current population survey (CPS) for 2020. The population information was then concatenated onto the small business information and was narrowed to cities with populations less than 10,000 residents, as well as counties with populations less than 75,000 residents. This allowed the research team to observe how many small towns and counties would be affected by the implementation of the proposed rule concepts.

Lastly, employment information was provided to the team by FWC regarding the total number of employees, position titles, and expected salaries for those that would be performing the risk evaluations of nonnative species following the implementation of the rule concepts. Four full-time employees as well as two other FWC staff members are expected to perform the risk evaluations of nonnative species following the implementation of the proposed rule. The four newly hired full-time employees consist of biologists for a combined employee compensation of **$207,151** for one year. This is split between the **$186,556** allocated to the new FWC employees, while **$20,595** is an estimated contribution of existing staff.[13] The FWC does not have expected need for new facilities and equipment for the implementation of the new rule, so we assume that the total cost to FWC is the addition of this salary to their current payroll. While the proposed rule does not have any details regarding eradication of nonnative species already established, this cost was taken into consideration (as the eradication of nonnative fish and wildlife from the surrounding environments can be costly). However, due to the nature of the proposed rule at hand, this indirect cost is not evaluated as the proposed rule makes no mention of eradication efforts and the nonnative species that are introduced or established in the state are expected to have a higher cost to businesses than directly to the FWC.

[13] Calculated as FTE 0.15 of $137,297 split between two existing employees.

Affected Groups

Small Businesses in Florida

According to the initial data preparation, there are approximately **3,550** small businesses that will be affected by the implementation of the proposed rule. These businesses include those that have an employment count of less than 200 employees as well as total generated revenue less than $5 million. The total aggregated sales for these businesses are **$365 million**, and the total number of listed full-time employees is **8,569** employees. These companies include all industries in the categories from the NETS data, and the sales and employment are in 2020 dollars. The distribution of sales by the percentile of the businesses can be seen below.

Distribution of Sales for Small Businesses					
Percentile	0%	10%	50%	90%	100%
Sales	$705	$27,922	$60,000	$179,532	$4,800,000

Small Towns

Meanwhile, the total number of impacted small towns throughout Florida is **116.** This includes the towns and cities that are affected, and while some towns may be in "large" counties, they are still included in the affected towns. As stated earlier, the small towns are those with a population of less than 10,000 residents. The total aggregated sales for these small businesses in these cities and towns is **$45.6 million**, and the total number of listed full-time employees is **1,006 employees**. While these small towns that will be affected are grouped under the small businesses and will not be ultimately aggregated, they provide specification into the breakdown of costs generated by the nonnative species rule concepts. The distribution of sales by percentile of businesses and towns, is shown below.

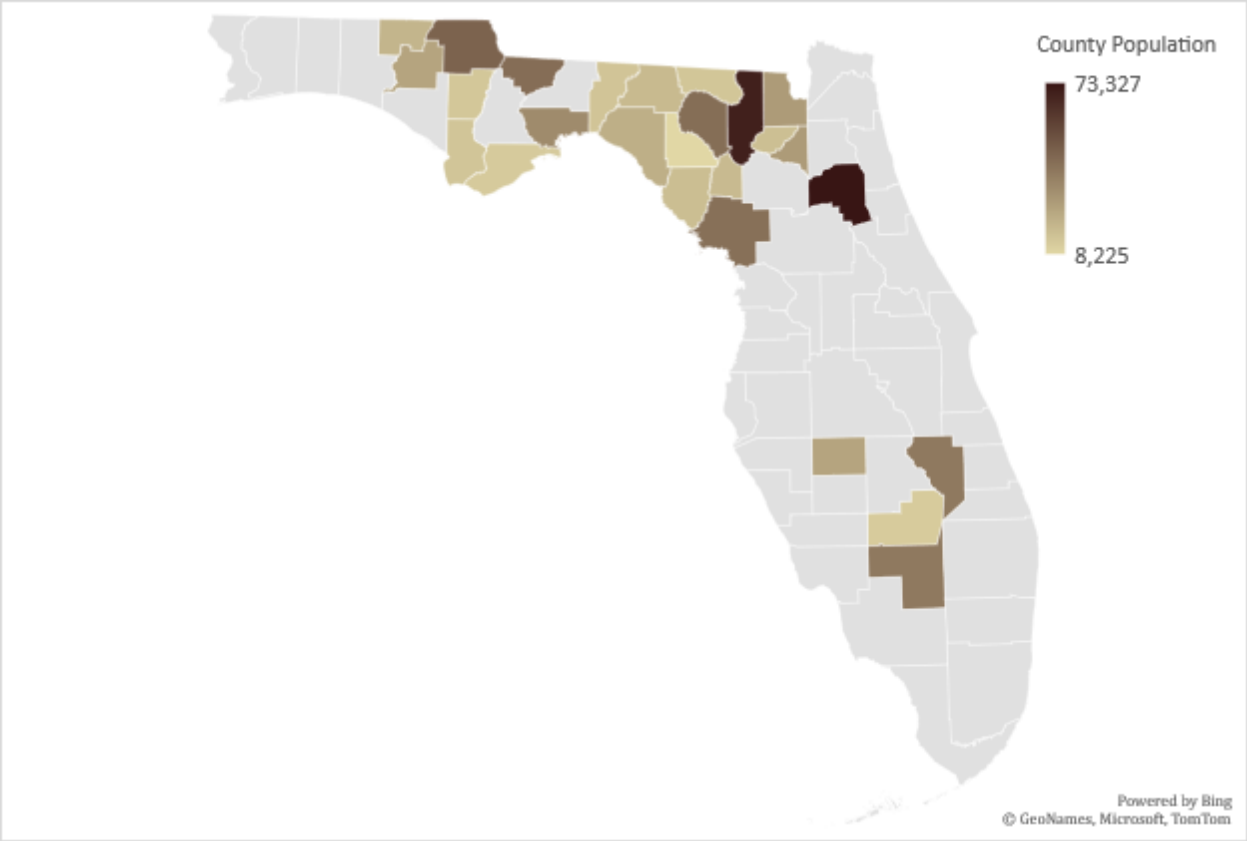
Distribution of Sales for Small Businesses in Small Towns					
Percentile	0%	10%	50%	90%	100%
Sales by Business	$5,000	$25,000	$60,000	$196,500	$2,914,100

Sales by Town	$8,000	$48,208	$158,112	$935,190	$3,529,737

Small Counties

The expected number of counties to be impacted is **26** counties out of the 67 counties in Florida. The total population as well as the county name for these counties is displayed in the table below. According to the map, many of these counties are in the northern area of Florida, and therefore smaller businesses along the border of Georgia are more likely to be impacted by the implementation of the nonnative species rule concepts, as well as the southern central area of Florida.

County	2020 Pop	County	2020 Pop
Baker	28,263	Holmes	19,657
Bradford	28,306	Jackson	47,309
Calhoun	13,644	Jefferson	14,507
Columbia	69,701	Lafayette	8,225
Dixie	16,758	Levy	42,912
Franklin	12,452	Madison	17,970
Gadsden	43,820	Okeechobee	39,636
Gilchrist	17,862	Putnam	73,327
Glades	12,127	Suwannee	43,472
Gulf	14,200	Taylor	21,800
Hamilton	14,006	Union	16,138
Hardee	25,326	Wakulla	33,766
Hendry	39,626	Washington	25,322



The total number of businesses affected in these towns is **150.** The total aggregated sales for these small businesses in these cities and towns is **$11.7 million**, and the total number of listed full-time employees is **297** employees. While these small counties that will be affected are grouped under the small businesses and will not be ultimately aggregated, they provide specification into the breakdown of costs generated by the nonnative species rule concepts. The distribution of sales by percentile of businesses and counties is presented below.

Distribution of Sales for Small Businesses in Small Towns					
Percentile	0%	10%	50%	90%	100%
Sales by business	$5,000	$26,950	$59,800	$120,500	$825,000
Sales by county	$27,000	$81,794	$318,911	$1,072,756	$1,758,703

Economic Analysis

SERC Risk Evaluation

According to 120.541 Florida Statutes[14], the following questions are asked to determine the estimated regulatory cost of a proposed rule as fulfillment of a statement of estimated regulatory costs (SERC). In the case of the regulation of nonnative species, these questions specifically pertain to the businesses that will feel the direct impact of these regulations in terms of cost or changes to revenue. The questions for this SERC were addressed by the research team are as follows.

Impact on economic growth

The proposed rule is not expected to have a direct adverse impact on economic growth, private-sector job creation or employment, or private sector investment in excess of $200,000 for the first year, nor $1 million in the aggregate within 5 years after the implementation of the rule. The research team concluded this as the proposed rule is not likely to reduce personal income, reduce total non-farm employment, reduce private housing starts, reduce visitors to Florida, reduce wages and salaries, nor will it reduce property income. The key effects of the implementation of the proposed rule are expected to primarily have direct and indirect costs for FWC management as well as businesses which participate in raising and selling nonnative species.

Impact on business competitiveness

The proposed rule is not expected to have an adverse impact, directly or indirectly, on the business competitiveness in excess of $1 million in the aggregate within 5 years after the implementation of the rule. This includes the ability of people doing business within the state of Florida to compete with people from other states. The proposed rule is not likely to raise the price of goods or services provided by a Florida business, cause any products produced in Florida to become too expensive, reduce Florida's workforce, or prevent investment in

[14] Further detail into the statute:
http://www.leg.state.fl.us/statutes/index.cfm?App_mode=Display_Statute&URL=0100-0199/0120/Sections/0120.54.html

other innovations. However, the proposed rule is likely to add regulation costs that are not present in other states. This can be seen by observing the total affected businesses as well as their costs from the regulation.

Impact on regulatory costs

The proposed rule is expected to increase regulatory costs, including transactional costs, per nonnative species application. The costs to individual companies submitting species for evaluation need to consider the time and resources necessary for these applications. While the application itself has no cost, the time and experience required to perform a literature review as well as completing a bio profile is outside of the scope of several businesses.

Impact on small businesses and small counties

According to Florida Statutes 288.703, "Small business" means, "…an independently owned and operated business concern that employs 200 or fewer permanent full-time employees and that, together with its affiliates, has a net worth of not more than $5 million or any firm based in this state which has a Small Business Administration 8(a) certification."[15] The kind of businesses that would be subject to the implemented nonnative species rule include companies seeking to import or establish new nonnative species. This can include pet importers, pet stores, breeders, and those working in aquaculture and agriculture. The cost to these companies is estimated as the regulation costs that implement the rule, as would be incurred by completing a nonnative species application. Established nonnative species will not be subject to this rule as the rule is applicable to the introduction of new species and does not account for the eradication of species that have already been established in Florida. Out of over 1 million companies in Florida, 3,483 companies will most likely be impacted by this rule concept. Additionally, out of the nearly 400 counties, cities, and towns in Florida, 111 small cities and towns will be affected.

[15] http://www.leg.state.fl.us/statutes/index.cfm?App_mode=Display_Statute&Search_String&URL=0200-0299/0288/Sections/0288.703.html

Results

Using the @RISK software tool, the research team found the low, average, and maximum costs to small businesses in Florida following the implementation of the proposed rule with cost distribution (using bounded tails). Additionally, the total linear calculated costs are provided as well as the total adverse effect on sales.

Costs to Small Businesses

RISK Output Cost to Small Businesses			
Number of Applications	Minimum	Mean	Maximum
10	**$ 121,173**	$ 314,721	$ 671,321
55	$ 666,453	**$ 1,730,964**	$ 3,692,268
500	$ 6,058,667	$ 15,736,035	**$ 33,566,072**

Cost of Application to Small Businesses			
Number of Applications	Minimum	Mean	Maximum
10	**$111,310**	$222,620	$890,490
55	$612,205	**$1,224,410**	$4,897,695
500	$5,565,500	$11,131,000	**$44,524,500**

Adverse Effect on Sales			
Number of Applications	Minimum	Mean	Maximum
10	**0.03%**	0.06%	0.24%
55	0.17%	**0.34%**	1.34%
500	1.52%	3.05%	**12.19%**

Costs to Small Towns

RISK Output Cost to Small Towns			
Number of Applications	Minimum	Mean	Maximum
2	**$ 23,313**	$ 63,022	$ 140,800
6	$ 64,111	**$ 173,309**	$ 387,201
100	$ 1,165,651	$ 3,151,075	**$ 7,040,018**

Cost of Application to Small Towns			
Number of Applications	Minimum	Mean	Maximum
2	**$22,262**	$44,524	$178,098
6	$61,221	**$122,441**	$489,770
100	$1,113,100	$2,226,200	**$8,904,900**

Adverse Effect on Sales in Small Towns			
Number of Applications	Minimum	Mean	Maximum
2	**0.05%**	0.10%	0.39%
6	0.13%	**0.27%**	1.07%
100	2.44%	4.88%	**19.53%**

Costs to Small Counties

RISK Output Cost to Small Counties			
Number of Applications	Minimum	Mean	Maximum
1	**$ 11,684**	$ 31,471	$ 66,606
4	$ 46,737	**$ 125,883**	$ 266,423
40	$ 303,790	$ 818,241	**$ 1,731,747**

Cost of Application to Small Counties			
Number of Applications	Minimum	Mean	Maximum
1	**$11,131**	$22,262	$89,049
4	$44,524	**$89,048**	$356,196
40	$445,240	$890,480	**$3,561,960**

Adverse Effect on Sales in Small Counties			
Number of Applications	Minimum	Mean	Maximum
1	**0.09%**	0.19%	0.76%
4	0.38%	**0.76%**	3.04%
40	3.80%	7.60%	**30.39%**

Conclusion

The Florida Fish and Wildlife Conservation Commission (FWC) recently contracted with the Florida State University Center for Economic Forecasting and Analysis (FSU CEFA) for an economic analysis of a newly proposed rule. This study conducts a statement of estimated regulatory costs (SERC) to evaluate the risk of nonnative species to Florida.

The overall goal of this economic study is to provide the Florida Fish and Wildlife Conservation Commission (FWC) with an initial Statement of Estimated Regulatory Cost (SERC) for implementing changes to Chapter 68-5 F.A.C, according to the SERC process outlined in 120.541 Florida Statutes.[16] This proposed rule is intended to prevent the introduction and establishment of new nonnative fish and wildlife by using a developed risk determination process to evaluate whether these species pose little or no threat to Florida. FWC is seeking to develop a SERC at the beginning of the rule making process to better understand the economic impacts to small businesses that may be affected by a change in themportantion allowances and risk determination process for nonnative fish and wildlife species. In addition to the expected costs to the FWC, the specific considerations of this SERC in addition to the processes laid out in statute can be separated into three parts as the impacts to licensed commercial sellers of nonnative fish and wildlife in Florida, including but not limited to pet stores, aquarium stores, aquaculture, and public exhibitors;

1) Costs to small businesses in Florida;
2) Costs to small towns in Florida;
3) Costs to small counties in Florida.

[16] Statute 150.541 see: https://www.flsenate.gov/laws/statutes/2018/120.541

The results of the analysis show that the average costs to the above criteria. Using risk analyses, the research team found that the total average cost to businesses in Florida are:

- **$1.7 Million** for small businesses;
- **$173K** for small towns;
- **$126K** for small counties.

According to the conditions of the SERC in line with Florida Statutes, the total risk costs of the implementation of the proposed nonnative species rule is greater than $200K in one year, and greater than $1M in the 5-year aggregate and therefore can be further evaluated.

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Appendix A. Detailed Information of Nonnative Species in Florida [17]

Nonnative Species in Florida				
	General Category	**Total Species**	**General Category**	**Total Species**
Nonnative Species in Florida	Amphibians	27	Mammals	19
	Birds	195	Marine Fish	40
	Freshwater Fish	55	Reptiles	174
	Invertebrates	35		
Grand Total		545		

[17] It should be noted that these species are, or have been, documented in Florida (at least once). They are not all considered established and reproducing in the wild.