STUDENT WORK SAMPLES

Science Grades 9-10

Examples of student work generated in completion of the CRA (version1) on invasive species are provided on the following pages. The student work examples are typed exactly as written by students. Words, punctuation, and spellings were not adjusted.

Below is the student CRA task:

Non-native species are a big concern in the United States. Large amounts of money are spent trying to control, reduce, or eliminate these species. You have read or viewed three sources of information on non-native species. These three sources are as follows:

1 Text 1: The Economic Cost of Large Constrictor Snakes by the U.S. Fish and Wildlife Service

2 Text 2 (video): Invasion of the Earthworms! from the National Science Foundation

3 Text 3: Why should I care about cogongrass? by C. Minteer

Write an essay of approximately one to two pages. Your essay should be a scientific argument that addresses the question: "What impact do non-native species have on an ecosystem once they have begun to be a self-sustaining population in the new ecosystem?"

Begin by selecting one of the following claims:

- Claim 1: Non-native species attack the native species and kill off the other populations in the ecosystem thus damaging the ecosystem.
- Claim 2: Non-native species change conditions in an ecosystem and can benefit or harm other species in the ecosystem.
- Claim 3: Non-native species are exotic species and a lot of money is spent to capture them so they are not living wild.

Support your claim by citing evidence from the three resources with reasoning that builds a strong (compelling) argument that persuades your readers. Include reasoning that would explain what is scientifically inaccurate about counterclaims (claims that you did not choose). End your essay with a concluding statement. Your essay should be written for an audience familiar with ecosystems. It should be clear and coherent.

Write your essay in the space provided in the next pages.

The task is intended to assess the following CCSS:
RST.9-10.1; RST.9-10.2; RST.9-10.4; RST.9-10.7; RST.9-10.8; RST.9-10.9; WHST.9-10.1; WHST. 9-10.4; and WHST. 9-10.9

STUDENT SAMPLE 1

The 20th and 21st century was the time in which the species of many plants and animals especially non-native species began to trouble the native species and the economy. Non-native species attack the native species and kill off other populations in the ecosystem thus damaging the ecosystem. Many people believe that non-native species an somehow benefit the ecosystem and the environment in some way; however, non-native species do more harm than good to the environment. Non-native species have always been known to harm the economy and the animals and plants in it economy and the animals and plants in it and are still seen as harmful species to the environment and ecosystems today. There are many different ways that non-native species harm the environment. Because of the harm that they cause, the U.S. spends billions of dollars to capture and relocate the species.

Cogongrass is one of the many non-native species that harms the environment. "It is one of the worst weeds in the world." "Cogongrass not only replaces native plants on which wild life food, it also has very high silica content, and therefore is unpalatable to native wild life" (text 3 lines 31-32). It is also a weed that becomes catastrophic when combined with fire. Burmese pythons are another type of non-native species. Many different groups and services spent millions of dollars to stop them. Earthworms are also a non-native species. "Earthworms eat through roots and dirt of plants" (text 2 video). Non-native species cause a lot of harm to the environment. The U.S. will do what it takes to stop them.

STUDENT SAMPLE 2

Non-native species attack the native species and kill off the other populations thus damaging the ecosystem. U.S. Fish are very harmful to our population because they cause problems and losses economically (lines 4 &5). If the government can find a solution to these fish, it can stop the growth sprout and other wildlife would be safe. Like U.S. Fish, cogongrass and earthworms are very much harmful to other species. These non-native can kill off other populations causing a decrease in the economy's wildlife. Cogongrass is the seventh worst weed in the world (line 1 & 2). It spreads by both seed and roots (Rhinzomes). Rhinzomes can spread up to 6 to 24 inches of soil and fragments of less than ¼ inch can resprout (lines 16 & 17) This makes control by disking and moving highly ineffective and can spread populations even further (lines 17 & 18). Congograss is a fire adapted species. It is a threat of wildfires or unmanageable burn increase with the presence of congograss (lines 27 & 28). It also replaces native plants, which feed wildelife. It also has very high silica content and is unadaptable to native wildlife (lines 28 & 29). Earthworms, although look harmless and are small, are also very harmful to wildlife. Earthworms can damage forests. They are also dangerous and harmful to the soil and dirt. Earthworms at the roots removing seeds from other insects.

STUDENT SAMPLE 3

Non-native species have a devastating impact on the economy. Non-native species change the condition in an ecosystem and can benefit or harm other species in the ecosystem. This primarily occurs once the species have begun to be a self-sustaining population in the new ecosystem. As stated in text 2 the invasive earthworms can be beneficial to crops by brining soil nutrients to the soil, but can be detrimental to forrest due to the fact that there two completely different species. Earthworms aren't the only invasive species that has forced the U.S. to pay billions of dollars to cotoin and eliminate; Cogongrass and Constrictor snakes are among the endangering species.

The U.S. reports an estimated $120 billion per year just to control and eradicate the invasive snakes due to the major losses and expenditures caused by the snake. (Text 1, line 4-7) This affect the ecosystem directly by the elimination of Key Largo woodraft and wood stork recovery (text 1, line 42-43). However, the constrictor snake is not the only consitrictor snake the U.S. is threatened by.

The invasive earthworm is another non-native creature that takes it toll on our ecosystem. (Text 2) Describes the earthworm as a creature that damages forest, changes habitat, damages nutrients and structures, as well as the chemistry composition of the soil. All of which cause a down spiral to the ecosystem, These invasive species eat rooting, destroy nutrients for seed, and cause potential issues for small plants as well as small animals. The following effects can all cause potential problems which is why is must be contained.

If that's not enough o clarify there is still yet another invasive species which is the cogongrass (text 3, line 13). States that the cogograss is a harmful grass from Asia which is considered the seventh worst weed in the world. cogongrass now contaminates 1.25 million acreas in SE United States (text 3 line 4) (text 3 line 6) Describes the congograss as exotic invasive weed that displaces plants and animals as well as threaten people and their structures, which drastically changes the ecosystem. The worst effect of cogongrass is that it is a fire adapted species and thrive where fire is a regular occurrence, meaning the threat of wildfire or unmanageable controlled burns greatly increases the presence of cogongrass. (text 3, line 27-28) These factors spell trouble for people and structures who are anywhere near algae infestation, which explains why so many funds are allocated.

In conclusion the three invasive species discussion in this paper here all taken a toll on the ecosystem and have sucumed government funds because their negative impacts.

STUDENT SAMPLE 4

Cogongrass is an invasive grass from Asia (line 1). Cogongrass is found in Florida Alabama and Mississippi. This grass can spread by seed and root fragmentation. This grass can be dangerous because it can kill native plants and effect humans. Cogongrass not only replaces native plants on which wild life feeds, it also has very high silica content and is unpalatable to native wild life. To prevent the spreading of congograss you need to call your local Forestry Commission. Do not try to mow through or near the area. Be sure ti thoroughly clean any and all equipment that has been used in or near infestated sites (lines 37-47).

STUDENT SAMPLE 5

Over the years, countless foreign species have been introduced into new ecosystems. While it may seem like a small matter, invasive species can actually drastically alter and affect their new homes. Taking strong evidence from pieces on the invasive species of constrictor snakes, earthworms, and cogongrass, it is clear that these species attack and harm native populations, damaging the balance of the ecosystem. They begin to impact the area most once they have integrated into their new home. Taking strong evidence from pieces on the invasive species of constrictor snakes, earthworms and cogongrass, it is clear that these species attack and harm native populations, damaging the balance of the ecosystem. They begin to impact the area most once they have integrated into their new home.

One example of an invasive species is the constrictor snake in Florida. These snakes prey on native species in danger of extinction. The article states, "these costs are uncured partly to prevent the extinction of species already endangered, two of which have been found as prey in Burmese python stomachs." This clearly shows evidence of the native species' populations slowly dwindling. Once native populations go extinct, the food chain will become unbalanced and lead to the extinction of other species.

A second example of the impact of invasive species can be drawn form evidence surrounding the earthworm. It is little known that the earthworm is invasive in some environments. While it does benefit crops, research shows that earthworms damage forests. The video portrays experiments with earthworms in soil, the results of which prove that the worm disrupts soil structure and nutrient

dynamics. It eats the rooting area out from underneath plants. This kills off understory plants, furthering damage to the food chain and taking away important sources of food.

A third and final example can be found in the article concerning the Asian invasive weed, cogongrass. Cogongrass is increasingly difficult to get rid of, and it possesses hardy, still leaves that can "cut the mouths and damage the teeth of wildlife, and therefore is unadapatable to native wildlife." The article states just how dense the infestations can also be. They can override the habitat of other native plants. Killing off important food sources. This also throws off the balance of the food chain.

In conclusion, it is overwhelmingly proven that invasive species kill native species and damage the ecosystem. They still live wild, however, and do not change the environmental conditions, they kill populations, take away resources, and disrupt the food chain. Invasive species are a danger that must be removed.

STUDENT SAMPLE 6

Non-native species in an ecosystem become a threat to native species and their ecosystems. One study reported that nationwide economic damages associated with non-native invasive species effects and their control amount to about $120 billion per year in the United States (Pimental, 2005) (Text 1, 6, 7). These non-native species become invasive and like invaders in a war, they have a want to conquer.

For example, the common earthworm is a warrior in hardwood forests. They decrease plant biodiversity and growth by disrupting soil, damaging habitats for positive soil organisms. Earthworms literally attack from the inside out by eating the actual rooting of plants.

The constrictor snakes of Florida take a different approach and outright murder in their cold-blooded manner. The Burmese python caused potential extinction of its prey. The woodrat and wood stork became endangered from the python (Text 1, 41 42).

Cogongrass, the "seventh worst weed in the world", grows and replaces native plants, and its seeds disperse and sprout new armies. Cogongrass have rhizomes that are deformed roots that build layers in the soil, allowing only the smallest plants to grow (Text 3, 16, 17). Cogongrass's seeds travel long distances and along with rhizomes, contaminate mulch and gardening equipment (Text 3, 13, 14, 47). Its terror does not stop at that though. It weaves into dense thickets that block out small animals (Text 3, 34, 35).

All of these invasive species mentioned conquer and kill the occupants of a ecosystem; whether it be from the inside out, outright killing, or blocking out the

wildlife. They all show that invasive species damage ecosystems so that only they can live and benefit in the end.

Some might say that earthworms actually encourage growth. This is true for garden like ecosystems, but in forests, they tunnel to conquer (Text 2). Others may claim that snakes are not really a problem in Florida, but that is because over 6 million dollars have been spent in the past 7 years to capture, control, and remove snakes.

Invasive species attack native species, kill off other populations, and damage ecosystems to become self-sustaining population, a conqueror.

STUDENT SAMPLE 7

Many people do not know the harm of an invasive species. An invasive species can intrude on an ecosystem and completely take over. A few other things are non-native organisms attack the native species and disrupt the ecosystem. Non-native species change conditions in an ecosystem that either benefits or harms other species, and non-native species make people pay lots of money to capture them.

Non-native organisms attack native species is a big problem. As it said from the constrictor snake article, the snakes are eating many organisms thus reducing the population of that organism. Also in the worm video, it said the worms would eat through the trots of a plant thus inabling it to grow.

Next, non-native species change the conditions of an ecosystem. A benefit is the earthworm in a farm setting. The worms fertilize the soil and allow crops to grow, but in a forest setting the worms move the dirt and nutrients and that harms many organisms in an ecosystem.

Finally, non-native species are making many people spend lots of money on capture these organisms. In the snake article, they said many organizations have spent over $6 billion since 2006 just on the Burmese Python. These organizations also spend lots of money on eradicating the snakes too.

There are many counterclaims saying invasive species aren't important or that it doesn't matter. Just three examples already prove that invasive species are an enormous problem.

In conclusion, invasive species are a big threat. They cost lots of money to capture, control, and eliminate. They also disrupt ecosystems and wipe out

native species. Overall, invasive species are a big deal and we should continue to eradicate these species.

STUDENT SAMPLE 8

I agree with claim 1 which states, "During severe drought conditions, plants and animals are strongly effected over time. There are big changes to some or all of the populations."

This is very true because in Text 1 it states that the impacts of drought can be very severe. It causes fire, less food. I also cause misfunction in the reproduction circles. The longer the drought lasts the more damage it can cause. Some animals are affected because, some of them feed on grass and when there is no grass they can't eat which kills them and their natural predator can't eat and so on.

STUDENT SAMPLE 9

Non-native species have a very large impact on an ecosystem. Non-native species attack the native species and kill off other species. Due to species being killed, the ecosystem gets damaged.

Non-native earthworms can be invasive. They get into the roots of small plants and eat them. This causes less amounts of food for small animals (NSF).

Cogongrass can be dangerous to the ecosystem. It spreads quickly and is a fire adapted species. This means that the chance of forest fires or unmanageable controlled burns is largely increased. Forest fires destroy ecosystems (C. Minteer).

Cogongrass grows so rapidly that it becomes very invasive. It can get so invasive that wild life and other plants can not exist. Cogongrass can grow very dense to the point that it animals can't get through it. This results in less habitats for animals and plants.

Non-native species are harmful to wildlife and plants. Non-native species can be come so invasive that they can wipe out entire ecosystems.

STUDENT SAMPLE 10

Many people are not fully aware of the damaging effects that invasive species can have on an ecosystem. Many organizations are trying to research, remove, and carry-out other tasks so that ecosystems will not be greatly altered. From small things like earthworms to large things like constrictor snakes, invasive species can have a huge impact on ecosystems. A great deal of research, time, and money has been put into controlling invasive species. The National Park Service has spent $317,000 annually on programs related to constrictor snake issues, such as researching snake biology for removal purposes in Everglades National Park. One study reported that nationwide, economic damages associated with nonnative species effects and their control amount to about $120 billion per year in the United States.

Researchers have found that even the smallest invasive species, such as an earthworm can cause great damage to an ecosystem. Worms literally eat the rooting zone from under plants, removing habitat for seeds, young plants and small animals. Though small in size, they can have a big impact on an ecosystem.

While some feel it is not necessary to put in time for research and removal of invasive species, they are probably not aware that these organizations are maintaining their safety. Invasive species have the potential to harm humans, therefore this research on invasive species is extremely important.

Overall, the research being conducted on invasive species is a great thing. Without the research that organizations are conducting ecosystems could be greatly affected, causing people to be harmed.

STUDENT SAMPLE 11

Non-native species, such as earthworms and cogon grass, can take over a habitat, while damaging or killing its native species. A species of non-native worms attacked a Missouri habitat. There was much less vegetation and the roots of some plants were destroyed because of the earthworms. They can also make the soil nutrients less available by consuming the nutrients for food. In another scenario, large constrictor snakes have taken over the state of Florida and its surrounding areas. The U.S. Fish and Wildlife Service and many other partnering organizations have spent millions of dollars trying to reduce and/or eliminate the snake problem. They have researched information about the species of the Burmese Pythons and several other species of large constrictor snakes in Florida. These invasive snakes can cause major economic losses and expenditures, therefore it is critical to control and eradicate the species (lines 1-7 of the "economic..."). Cogongrass is another non-native, invasive species that has taken over south-eastern U.S. This species of grass is incredibly easily spread. It can be spread by air, and other plants. It grows very rapidly and can make forest fires worst. "Cogongrass fires are much hotter, faster, and higher than native grass fires" (Why should I care about cogongrass?). Some people can say that worms benefit the soil and plants and that they don't destroy the plants. Earthworms can help the plants in their native habitat, but when they go to a non-native habitat, they can harm the plants and the roots in that area. (In vasion of the Earthworms!). Non-Native species can takeover a habitat and destroy the plants and animals that live in the area.

STUDENT SAMPLE 12

Large constrictor snakes have been spreading through Florida and causing major expenditures and economic losses. Were spending way to much money on trying to capture them. Over 6 million dollars have been spent on the constrictor problem since 2005. (line 2) If the constrictor snake problem continues then the extinction of the Key Largo Woodrat may be in danger. (line 22-23) These cost are incurred partly to prevent the extinction of species already indangered. (line 40) Some indangered prey has been found in the Burmese python's stomachs. (line 41) Invasive nonnative Earth worms are changing the habitat in the Great Lakes region. Cindy Hale has studying the worms and promoting awareness. Western Great Lakes has no native Earth worms. After all, Earth worms aren't always bad. Some are actually good for crops. Yet in this case, the Earth worms are contaminating the soil. Cogongrass in an invasive grass from Asia. It is destroying Alabama. Cogongrass in the seventh worst weed in the world. (line 1) It also is very dangerous because it catches fire easily. (line 27-29) It is possible that Cogongrass can spread rapidly because it produces up to 3,000 seeds a season. (line 14) Once a population is started, eradication is difficult, expensive, and could take years. (line 26) It may grow very thick + may reduce the chance of native plants + wildlife to grow.

STUDENT SAMPLE 13

Non-native species change conditions in a ecosystem and can benefit or harm other species in the ecosystem. Cogongrass has taken native species haitat. Cogongrass can spread rapidly and can spread by infected equipment. As it says in why should I care about Cogongrass, it contains a high silica content, and therefore is unpalatable to native wildlife.

The invasive snakes Burmese pythons have been found with endangered species in there stomach contents. As it says in the Economic Cost of Large Constrictor Snakes the Key Largo Wood Rat has been found prey in the python stomach. The wood stork was also found in the stomachs. Although the Puerto Rican parrots have not been found in the stomachs it is a ever growing threat. The pythons made made a big impact on alligators in the Florida Everglades. It has been found in the aligators stomach, but the alligator has been found in the python stomach.

The non native worms have destroyed the new growth. The worms mix the layers of dirt that is essential for new plants.

STUDENT SAMPLE 14

The Burmese python is a non native invader in the Florida region. It serves as a danger to native species and plant life because it interrupts the food chain as it has no natural predators in the area.

Agencies such as the national park service, US department of agriculture, South Florida Water Management District, US Geological Survey, Florida Fish and Wildlife Conservation Commission, University of Florida, county governments and non government organizations work with the service to combat the spread of invasive species throughout Florida and the rest of the United States. These actions include capture and removal; public education and awareness; spatial ecology and movement studies using radio telemetry, satellite, and GPS technology, diet, thermal biology; trap development; and trails; impacts analysis, pilot studies for genetics and salinity tolerance; potential use if unmanned aerial vehicles with thermal infrared cameras to detect large constrictor snakes in the field; and training dogs to find non native constrictor snakes.

All of these actions, money spent, and manpower are a gigantic fighting force against this invading species. Overall there has been well over 2 million dollars spent in the fight against the Burmese python but that shouldn't be a factor in deciding to continue the work, in the ling run it will pay off. A lot of money doesn't have to be spent in the capture and removal of these snakes all that it would need would be volunteer programs put into place to do the work and there will most likely be more than enough people to sign up for it. Non native species do not change the weather or climate in an ecosystem, they are not a

limiting factor for weather, the native species should be able to adapt to this new predator and find ways to get around it or fight it over time.

STUDENT SAMPLE 15

Claim 2.

Non-native species change conditions in an ecosystem and can benefit or harm other species in the ecosystem. Invasive species can harm native plants and animals. It can also threaten the safety of people. They compete with native species for the same resources. Non-native species can bring in diseases that harm others. the species can reproduce and spread rapidly. Non-native species may not attack other species, they might fit in the habitat. Communities might not have to spend a lot of money if the non-native species aren't harmful. They may benefit areas. The conditions that are changed in the habitat may be beneficial to an ecosystem. There is non-native species all over the U.S.

STUDENT SAMPLE 16

Non-native species attack the native species and kill off the other populations in the ecosystem thus damaging the ecosystem, because the non-native species have no normal habitat that they are use to, so they kill other animals or other species and hurt the habitat that these species live in. Many habitats are hurt and destroyed because of non-native species and all hurts or destroys the ecosystem of the native species. Sure catching non-native species cost a lot of money, but I would rather have them caught then eating the environments plant and animal life. Also non-native can benefit the environment but by benefiting one thing it may hurt another. Just like ckudzu, it helps the Basin have plant life but also grows uncontrollable and effects other vegetation and plant growth. Although non-native can benefit and many cost a lot of money to contain or catch, they are attacking native life from living.

STUDENT SAMPLE 17

Non-native species change conditions in an ecosystem and can benefit or harm other species in an ecosystem. There ahs been many non-native invasive species come into America. They have caused damage any many parts.

Cogongrass has caused a major problem in the South, because it is spread easily and it kills off native grass as sited in the article. The python problem in Florida has caused a major problem as well, they have infested Florida and have been the predator of a few endangered species as sited in lines 40-47 of the article. This is a growing problem in Florida, because the population is growing very rapidly. The worms on the other hand helps and hurts the ecosystem. They are non-native in the Great Lakes region which they have infested. They help by cultivating the soil in some areas. They have caused damage by killing off some of the underbrush in the hardwood forests. Claim one is inaccurate because they infestations of pythons and worms have helped in some ways. The worms have cultivated the land and the pythons have help with rat infestation. Claim three is inaccurate because the worms haven't costed much money and don't cause as much problem, and the cogongrass and pythons are not endangered and are trying to be eradicated from the land. They all benefit and damage the ecosystem in their own ways!

STUDENT SAMPLE 18

I support claim 3 – non-native species change conditions in an ecosystem and can benefit or harm other species in the ecosystem. Because, some times they can be a benefit for the ecosystem they live in. Like the earthworms they can benefit many crops in where they live. But also they eat the rooting soil of some plants. So it doesn't let the plants grow. Also, they sometimes benefit or harm the ecosystem. Also like cogongrass, it is an invasive grass from Asia. It's considered "the seventh worst weed in the world." It can displace native plants, animals, also people's safety. Cogongrass really doesn't benefit anything. But earthworms, sometimes do they might eat the rooting soil of plants, that might be dangerous to the ecosystem. I disagree with claim 1 – non-native species attack the native species and kill off the other populations in the ecosystem thus damaging the ecosystem. The all the earthworms just kill off everything in their way. They can be beneficial to some plants also, to the ecosystem.

STUDENT SAMPLE 19

Non-native species change conditions in an ecosystem and can benefit and harm other species in the ecosystem. Many things such as different types of animals and various types of plants are invasive to native species. Most of the non-native species can come and completely wipe out native species and can harm others.

The Burmese python is a native species and is very dangerous. Many organizations such as the "National Park Services" and the "US Department of Agriculture" have invested in eliminating this issue. All kinds of different organizations has come together and spent $720,000 trying to fix this invasive species. Burmese pythons are eating away some of the endangered species.

Another invasive species that we need to stop are the earthworms. Earthworms are not dangerous to man, but they are very effective to forest and plant life. They can eat threw the rooting zone and mix around the soil under plants to make them die or not fertile. When earthworms are not present, all of the stages of the forest are present, but they are the forest has very few trees and plants.

The last thing that's ruining species is cogongrass. Cogongrass is very flamable and can burn mush faster than normal grass. Its very rough and stiff with the result being animals are getting cut and hurt.

A lot of things are hurting our ecosystem. Its our job to protect it and fix the problem.

STUDENT SAMPLE 20

Non-native species can be harmful to other ecosystems. They can affect the ways other animals adopt to their environment. Cogongrass for instance. If that starts growing in an environment animals may hurt themselves because the budding of the Cogongrass can hurt their mouths. Non-native species maybe exotic but does not mean that they aren't harmful. We should not have to spend a bunch of money to get rid of that certain species. Species such as snakes are very harmful. They can potentially kill other animals, not just cause serious injury to that particular animal. Cogongrass is not only harmful to animals mouths but to paws (feet) as well. Cogongrass can cause an even more powerful fire if it was started especially in a place prone to wildfires.