

# ANSWER KEY

**Part 1 (15 pts): Answers should be EXACT, no partial credit.**

A: Glassy-Winged Sharpshooter (*Homalodisca vitripennis*)

B: Princess Tree (*Paulownia tomentosa*)

C: Chinese Mitten Crab (*Eriocheir sinensis*)

D: Fig Buttercup (*Ficaria verna*)

E: Rusty Crayfish (*Orconectes rusticus*)

F: Scotch Broom (*Cytisus scoparius*)

G: Asian Carps (No specific scientific name)

H: Spotted Knapweed (*Centaurea stoebe*)

I: Water Hyacinth (*Eichhornia crassipes*)

J: Asian Swamp Eel (*Monopterus albus*)

K: Mile-A-Minute Weed (*Persicaria perfoliata*)

L: Zebra Mussel (*Dreissena polymorpha*)

M: Eurasian Watermilfoil (*Myriophyllum spicatum*)

N: Mexican Fruit Fly (*Anastrepha ludens*)

O: Tropical Soda Apple (*Solanum viarum*)

**Part 2: Species Information. Use the species from part 1 to answer the following questions. (77 pts)**

1. How was Species A introduced into the United States? (1 pt)  
Nursery stock transported from Southeast.
2. What is the disease that Species A causes which affects grapevines? (1 pt)  
Pierce's Disease.
3. Give 2 different states where Species B can be found. (½ pt each, 1 pt total)  
Any two of the following are acceptable.  
WA, TX, OK, AR, LA, MO, IL, WI, MS, AL, GA, FL, SC, NC, VA, WV, KY, TN, IN, OH, PA, NJ, NY, DC, CT, MA, DE, RI.
4. Provide 2 different methods of control for Species B. (1 pt each, 2 pts total)  
Answers should be specific. It is not enough to say "herbicidal control" or "mechanical control"  
Any 2 of the following are acceptable.  
Cutting trees at ground level, girdling (with follow up treatment with foliar herbicide), Hand pulling, Herbicidal control using foliar spray with glyphosate and triclopyr.

5. Provide 2 harmful impacts of Species C. (1 pt each, 2 pts total)  
Interference with fish salvage operations, fish passage facilities, water treatment plants, power plants, and other facilities (clog pipes); secondary host of Oriental lung fluke (*Paragonimus westermani*); bioaccumulation of contaminants.
6. Describe the environment in which Species C reproduces. (2 pts)  
Brackish and saltwater estuaries.
7. Provide 1 feature of Species C's adaptive anatomy. (1 pt)  
Any of the following are acceptable  
Skilled at walking on land; high reproductive rate; wide range of physiological tolerances.
8. Why does Species D have a developmental advantage over native species in its region? (2 pts)  
It emerges in the Winter in advance of most native species, thus establishing a competitive advantage. It forms a thick green blanket across the ground through which native plants are unable to penetrate.
9. What is Species D's native region? (1 pt)  
Europe.
10. In which state was species E first found outside of its native range? (1 pt)  
Wisconsin in the 1960s.
11. Provide 2 harmful impacts of Species E. (1 pt each, 2 pts total)  
Any 2 of the following are acceptable.  
Competes with native crayfish species and causes a decline in native species abundance; destruction of aquatic plant beds; devours so much underwater vegetation that food, shelter, and spawning sites for other organisms are dramatically reduced; decline in recreational swimming.
12. Provide 2 methods of control for Species F. (1 pt each, 2 pts total)  
Answers should be specific. It is not enough to say "herbicidal control" or "mechanical control"  
Any 2 of the following are acceptable.  
Physical methods include hand weeding, pulling, digging, hoeing, or cutting. Chopping or mowing mechanically.  
Thermal control using flame throwers or other weed burners to girdle the lower stems. Prescribed area burning has also been used.  
Biological control by using goats to graze the plant.  
Chemical control using spot herbicides applied to either stems or cut stumps. Various broadcast herbicides, including 2,4-D, picloram, and sodium chlorate have also been effective.
13. Describe how the bark Species F changes as it matures. (2 pts)  
The bark is smooth when it is young and develops shallow fissures as the shrub matures
14. Provide 2 other varieties of Species G. (1/2 pt each, 1 pt total)

Any 2 of the following are acceptable.

Grass carp, Common carp, Silver carp, Largescale Silver carp, Bighead carp, Black carp, Goldfish, Crucian carp, Mud carp.

15. What are 2 ways in which Species G was transported? (1 pt each, 2 pts total)

Jumped over natural barriers; Mistaken for bait fish by humans.

16. Describe Species G's diet. (1 pt)

Fed on vegetation, plankton, aquatic insect, and native fish larvae (in direct competition with native species).

Award point if at least 2 of the above are listed.

17. How does Species H reproduce? (1 pt)

Either one of the following is acceptable.

By seed and by vegetative growth through the roots.

18. What are 2 other Species that have been used as biological control for Species H? (1 pt each, 2 pts total)

Any 2 of the following are acceptable.

The spotted knapweed seedhead moth (*Metzneria paucipunctella*); Knapweed gall fly (*Urophora affinis* and *U. quadrifasciata*); Cochylid moth larvae (*Agapeta zoegana*); Bronze knapweed root borer (*Sphenoptera jugoslavica*).

19. What are 2 impacts of Species I? (1 pt each, 2 pts total)

Any 2 of the following are acceptable.

Forms dense colonies that block sunlight and crowd out native species. Blocks sunlight from penetrating bodies of water and effectively chokes the entire water body. Deprives other plants and animals of oxygenated water. Causes high evaporation rate and loss of water and degrades water quality. Impedes transport of irrigation and drainage water in canals and ditches, hinders navigation, interferes with hydraulic schemes, decreases the possibilities for washing and bathing, decreases human food production, and decreases recreation.

20. How does Species I reproduce? (1 pt)

Vegetative reproduction by short runner stems (stolons) that radiate from the base of the plant to form daughter plants. Also reproduces by seeds.

21. Under ideal conditions, approximately how many plants can a single plant of Species I produce in 50 days? (3 pts)

About 3000. Anywhere from 2000-4000 should be acceptable.

22. What are 2 reasons why Species I is such a successful invasive species? (1 pt each, 2 pts total)

Any 2 of the following are acceptable.

Has adaptations that allow it to grow and spread rapidly in freshwater. It can withstand extremes of nutrient supply, pH level, temperature, and even grow in toxic water. Seeds are dispersed by birds and can remain viable for 15-20 years. A single plant can produce 3000 seeds in 50 days.

23. How was Species J introduced to the US? (1 pt)

Imported as a food source and for the aquarium trade/fish farm.

24. What are 2 features of Species J's adaptive anatomy? (1 pt each, 2 pts total)

Any 2 of the following are acceptable.

High tolerance for temperature change; can bury in moist ground to survive for long periods without water; can breathe air and travel on land if moist; can survive weeks without food; can live in waters with low dissolved oxygen concentrations and survive temperatures as low as 8C; generalized predator

25. True/false. Species J is a diurnal predator. (2 pts)

False.

26. How long is Species K's germination period? (2 pts)

About 8 weeks. Anywhere from 7-9 weeks is acceptable.

27. **\*TIEBREAK\*** What is Species K's nickname? (1 pt)

Devil's tear-thumb

28. How does Species K reproduce? (1 pt)

Self-fertile; does not need any pollinators to produce viable seeds. Requires an 8 week vernalization period.

29. Provide 1 piece of legislation which aimed to control Species L. (2 pts)

Lacey Act of 1900; National Invasive Species Act of 1996; Alien Species Prevention and Enforcement Act of 1992.

30. What are 2 major impacts of Species L? (1 pt each, 2 pts total)

Any 2 of the following are acceptable.

Outcompetes native species; clogs pipes; filter up to 1 liter of water per day; filtering substances such as PCB's, heavy metals, and toxins which can enter the food chain in dangerous levels; can cause overheating of docks and boat engines.

31. **\*TIEBREAK\*** Up to how many eggs can Species L lay per season? (2 pts)

About 1,000,000. Anywhere from 900,000-1,100,000 should be acceptable.

32. If Species M is submerged under water, new growth with aquatic leaves develops in how many days? (2 pts)

Around 7-10 days.

33. True/false: Seeds are viable, but they are not an important means of dispersal for Species M. (2 pts)

True.

34. Name 2 states in which Species M is NOT present. (2 pts each, 4 pts total)

Any 2 of the following are acceptable.

Wyoming, Rhode island, Hawaii.

35. True/false: Species M can tolerate a pH of 4. (2 pts)

False.

36. **\*TIEBREAK\*** In how many states is Species N found? (4 pts)

0. The last of the species was eradicated in Texas in 2012.

37. Which of the following is a preferred host for Species N? a) Lemon b) Sour limes c) Grapefruit d) Pineapple (4 pts)

C.

38. If a single member of Species N is trapped in an orchard, what would be the following course of action? (4 pts)

All fruit from that orchard is quarantined for 2 weeks. More sterile flies are released in the area.

39. Choose the best comparison of size to the fruit of Species O. (2 pts)

a) A basketball b) A golf ball c) A green Skittle d) A baseball (Balls are to regulation sizes)

B.

40. How does Species O reproduce? (1 pt)

By seed or perennial roots. Roots have buds that regenerate new shoots.

41. True/false: A white seed of Species O is viable for germination. (2 pts)

False.

### Part 3 (16 pts)

42. This invasive species had become naturalized on Vancouver Island in 1900, where it was introduced by Captain Walter Grant in 1850. (4 pts)

F; Scotch Broom.

43. An electric dispersal barrier constructed across the Chicago Sanitary and Ship Canal is being used to stop these invaders from entering the Great Lakes. (4 pts)

G; Asian Carp.

44. Some females of this invasive species transition to males as they mature. All larger individuals are males, transsexual). (4 pts)

J; Asian Swamp Eel.

45. This invasive species exists in both diploid and tetraploid forms. Tetraploid type prefers more shady locations and frequently develops bulbils at the base of the stalk. (4 pts)

D; Fig Buttercup.

**Part 4: Fungi and Viruses. Give the Scientific Name for each of the following. Then match each letter to a corresponding Fungi or Virus. (24.5 pts)**

**\*½ pt given for only the scientific name. 3 pts given if the matching is correct.\***

46. Dutch Elm Disease

*Ophiostoma. D*

47. Butternut Canker

*Sirococcus clavigignenti-juglandacearum. C.*

48. Oak Wilt

*Ceratocystis fagacearum. G.*

49. White Nose Bat Syndrome

*Pseudogymnoascus destructans. F.*

50. Bluetongue Virus

*Orbivirus. B.*

51. West Nile Virus

*Flavivirus. E*

52. Bird Flu

*H5N5. A*