# Implementation Plan and Outcomes of the Managing Prairie Dogs for Ferret Reintroduction: A Case Study in an online environment. John Starnes, Somerset Community College

**Course and Format**: The case study was implemented in an introductory biology course for non-majors in an online asynchronous format.

**Purpose**: The purpose of using this case study was to improve students’ ability to connect biological information to real world issues and to develop quantitative literacy.

**Learning Objectives**: Students will understand predator-prey relationships and population dynamics.

1. **Quantitative Literacy:**
	1. Students should be able to use mathematics to solve a problem in everyday life.
		1. Interpret data embedded in a Figure (Map)
		2. Represent data by answering questions
		3. Use the data to calculate and then apply the results to an issue
2. **Socio-Environmental:**
	1. Students should be able to understand the effects humans have on natural systems.
	2. Students should be able to understand the implications of policy and individual stakeholder decisions on natural systems.

**Implementation and Pedagogy**: Context-based learning was used in introducing students to a scenario presented in a case study. Students were first exposed to the needed biological background information relating to the case using an adaptive learning platform (Learnsmart assignment from McGraw-Hill), and then the case study was used to enhance the connections to the material. The students answered essay-based questions taken from the case study on the topic of the reintroduction of the Black-footed ferrets from a captive environment to a natural one. The students then used GIS data based on prairie dog populations and historic ranges to develop a plan for ferret reintroduction. Learning through augmentation was also used by having students discuss the topics in an online forum as if they were stakeholders relating to the issues.

**Setup and Results:**

Students reviewed and completed an adaptive reading assignment on Chapter 35. Populations and Communities in the textbook Johnson, G. B. (2018). *The living world* (9e ed.). New York, NY: McGraw-Hill Education.

The case study [Managing Prairie Dogs for Ferret Reintroduction](https://www.sesync.org/managing-prairie-dogs-for-ferret-reintroduction-2016-9) (A.M. Aramati Casper, Dorothy P. Hill, and Melanie K. Rathburn, SESYNC) was broken down into different sections in a module on Blackboard. Parts C and D were left out due to time constraints and perceived level of the students.

**Online class size**: 28 students. 21 students were still active in the online course environment at the time of implementation.

**Time to complete**: Students were given one week to complete the module in Blackboard following completion of previous material in the course. The module was open for a period of three weeks prior to the due date for students who were working ahead in the course.

**Blackboard Learning Management System Module:**



1. In this section the scenario from the case study was used in its entirety.
2. Information from the original case study under part A. Captive Breeding of Black-footed Ferrets was provided to students and the video in part 4 <https://www.youtube.com/watch?v=1tJycGXJVNg&oref=https%3A%2F%2Fwww.youtube.com%2Fwatch%3Fv%3D1tJycGXJVNg&has_verified=1> . (In the future the YouTube video as suggested in the teaching notes for the case study should be included in the introductory material <https://www.youtube.com/watch?v=1U-YCXjf4_I>)
3. Two essay questions from the case study were assessed. (**19/21 students completed the assignment successfully** with a grade of 70% or above)
	1. Identify some problems or concerns about a captive breeding program for black-footed ferrets. Think about the possible threats to maintaining a sustainable, reproductively healthy population of black-footed ferrets. For each threat, what are some strategies that could be used to mitigate their negative effects?
	2. In the wild, ferrets are not restricted in their movements and will move across both state and national boundaries creating a number of transboundary issues. What are some of the issues that the Black-footed ferret recovery implementation team (RIT) will need to address considering the fact that ferrets cross state lines and also into Canada. (Several students had trouble connecting how laws could be different between states or countries (This would be a good place to have students do further research and highlighting some of the differences in management across these boundaries that could affect the ferrets and prairie dog populations.)
4. Introductory information (from Part B. Where to Reintroduce Ferrets) was copied into this section with the link to the Interactive map. (Based on responses in part 5 a short video lecture/discussion of population ranges should be introduced prior to the exercise. A discussion on the territorial nature of female ferrets may also be helpful, or to an introduction to other examples of this phenomenon may help the students understand this better.)
5. Three questions were asked of the students from the case study. (**15/21 students complete the assignment successfully** with a grade of 70% or above)
	1. Using Map 1, how does the historical range of black-footed ferrets compare to the historical range of black-tailed prairie dogs?
	2. The interactive prairie dog colony map (Map 4) provides information that can be used to select release sites for captive-bred ferrets. Based only on size of prairie dog colonies, where are the best sites on the Fort Belknap Reservation to release ferrets? What other factors should be considered when identifying possible release sites?
	3. Given the territorial nature of ferrets, how many reproductive females could be supported at each of these sites? (Use the median colony size) (Have students show all their work.)
6. Provided the introductory paragraph from Part E. Social-Environmental Issues with Prairie Dogs and Ferrets. (A video discussing the plague in prairie dogs and implications to human health needs to be included).
	1. Modified the case study assignment to as follows: (**17/21 actively participated in the discussions**)
		1. Read through several newspaper articles (see suggestions) or find more recent articles on the internet. Identify the stakeholders from each article. Write down their opinions and concerns as raised in these articles, and one piece of evidence that supports their point of view. Mass vaccination of prairie dogs may be necessary to sustain black-footed ferret populations. Assume the role of your assigned stakeholder to discuss the pros and cons of vaccinating prairie dogs. Should all prairie dog towns be vaccinated or only those that are ferret release sites? What are the unintended consequences of a mass vaccination program? Could a successful vaccination program increase tensions amongst stakeholders regarding the management of prairie dog populations?
		2. Post your answers in the discussion board from the viewpoint of one of the stakeholders. Comment on at least three other students’ posts on their position and possible issues they are overlooking. (Develop groups in the online course and assign the role of different stakeholders or assign individual students in to a stakeholder role.)

**Conclusions and Future Plans:** Within the setup and results sections, I have included notes in red to indicate areas where information needs to be added for the online course. In general, students need to be provided with a longer period to complete the case study module, and multiple course competencies should be incorporated using this case study to shorten the workload of the students in other areas of the course and develop a more project-based feel to the course. Other topics that could be incorporated could relate to allele frequency changes in populations such as genetic drift, geneflow, and natural selection.

 Short videos or mini lectures and more supplemental information should be supplied to students on population range and predator prey dynamics. It would be beneficial to add parts C and D of the case study into the module to help students become more comfortable with data and calculations. These sections would also likely help students to understand the importance of prey population levels and characteristics.

Performance on the case study module was not directly correlated to overall class performance on the general Student Learning Outcomes or the final grade achieved by the students within this section of the course. A comparison between courses where the case is used to courses where the case study is not used would be needed to determine the impact the case study has on student performance.