Lesson 6 Part 3

A COLLECTION OR FIELD GUIDE:

SYSTEMS AND SYSTEM MODELS

SYSTEMS

- A system is a collection of parts which are interconnected because they continually affect each other over time in unpredictable ways.
- A system can carry out functions its individual parts cannot.
- To understand systems, the relationships between or among the parts must be examined.
- Thinking of a natural feature as a system helps us think about the impacts and interactions that lead to changes we can observe.
- Studying systems is about studying the **interconnections** and **relationships** between things.

SYSTEM MODELS

- Models can be used to represent systems and their interactions—such as inputs, processes and outputs—and energy and matter flows within systems.
- Models are limited in that they only represent certain aspects of the system under study.
- Models can be used to predict the behavior of a system, but these predictions have limited precision and reliability.

How to Study Systems and System Models

Ask yourself these questions when you are doing an observation:

- What are the parts of this system?
- What are the boundaries?
- How does the system work?
- How do the parts of the system interact?
- What would happen if a part was removed?
- What would happen if a part were added?

Examples of
Systems and System Models

- **A "Tiny World"**
  - **Things on a lawn**
  - **Under rocks or a log**
  - **On a rotting log**
  - **In puddles**
- **Populations of organisms (a herd, a hive)**
- **Parts of one organism (Parts of a plant)**
- **Communities of different organisms (An oak woodland)**
- **An ecosystem (A pond, a forest, a prairie)**

Natural systems and their interconnections can be investigated by:

- looking at the **adaptations of the species** living there; (e.g. the hawk can fly and has superb vision to locate the rabbit)
- examining the **flow of energy** through the system(s); (e.g. apple tree gets energy from sun and some is stored in the apple which you and the ants eat, and which gives nourishment)
- exploring the **networks** or webs of relationships; (e.g. the grass that took up the water did so through a network of roots)
- understanding the **cycling** of water, air and other nutrients; (The apple core is broken down by bacteria which make the nutrients in it available for the grass to use.)

Your Turn

1. Make a field guide of your chosen subject that shows **Systems and System Models.**
2. Include three to five things in your field guide.
   1. This could be the parts of a “tiny world” or
   2. 3-5 examples of similar systems such as plants showing their parts).
3. Arrange the page so that you show a drawing with words and numbers next to it.
4. Record observations with words, pictures, and numbers, paying attention to similarities and differences and evidence of **Systems and System Models.**

Remember to begin with your metadata

Date, Day, Time

Location, habitat

Weather

Temperature

Wind

% Cloud cover

Plan your page

Heading first

Then Title

Create enough space to show all 3 to 5 subjects.

Remember to include ABC’s, 123’s and drawing/sketch/diagram for each subject.

Use the next page for your reflection questions/paragraph.

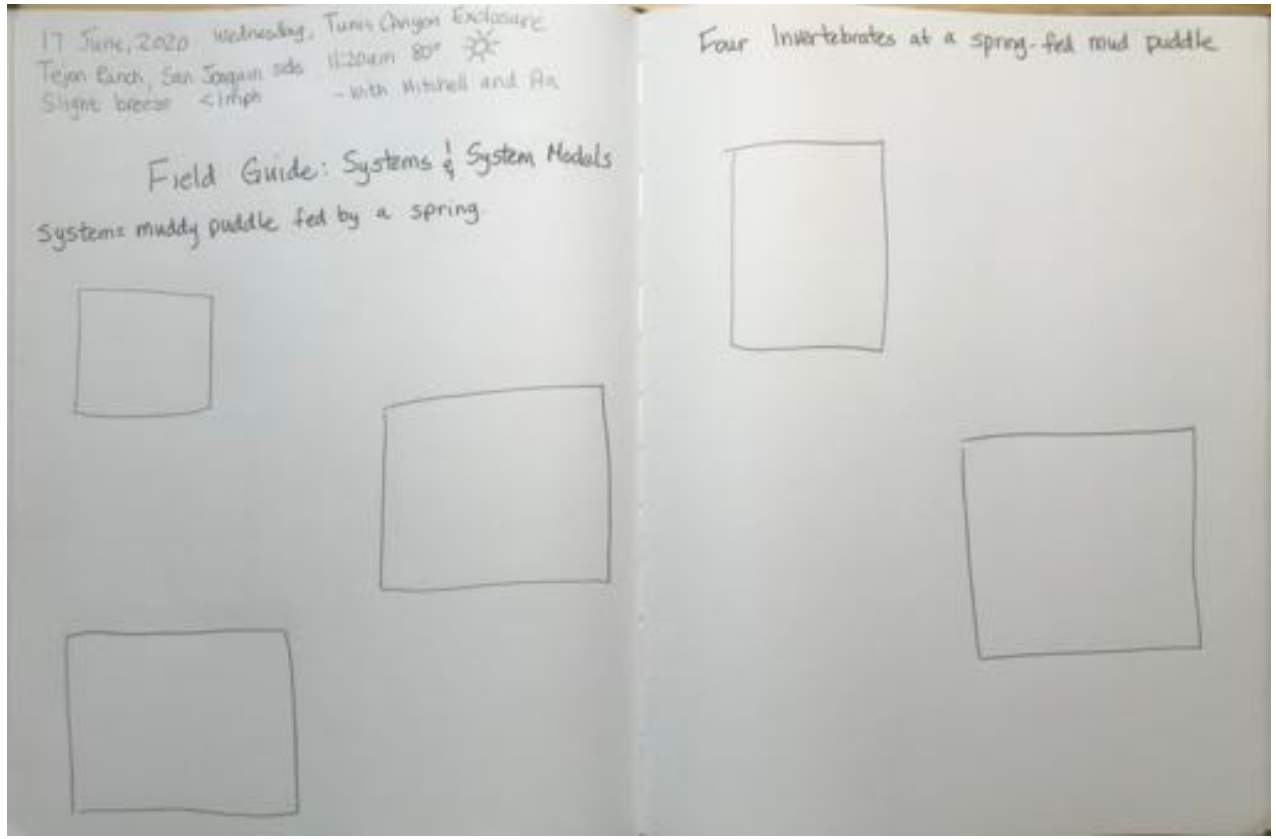
Remember

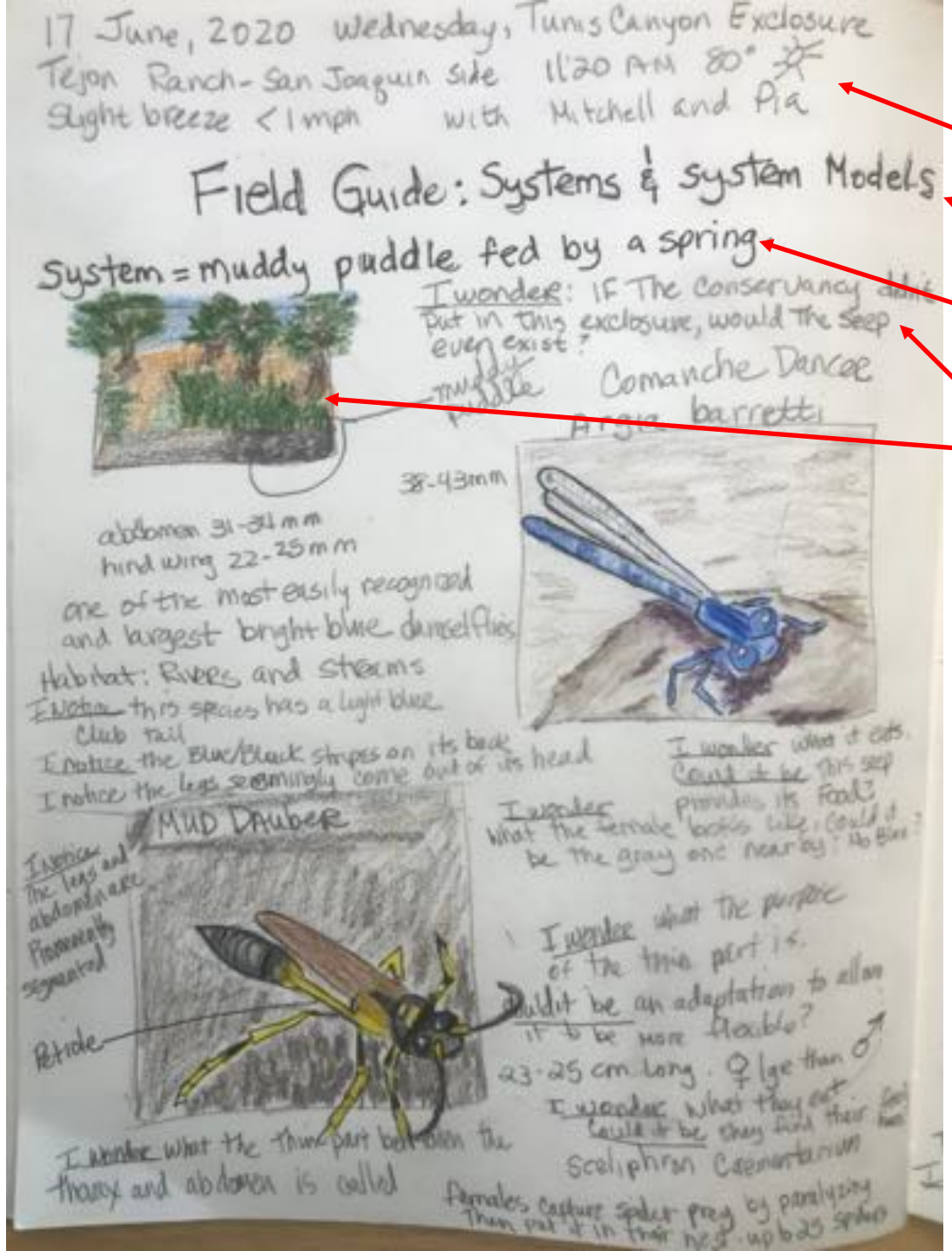
For each “I wonder”, Write one or two hypotheses by completing the sentence frame:

“Could it be…”

Plan your layout the way you want it.

- Here’s mine:
  - Two pages
  - Metadata top-left
  - Title under metadata
  - Sub-title top right
  - 5 boxes with space for writing
  - The top-left box is for a mini landscape
    - Landscapes give a sense of place





Notice:

*Metadata

*Title

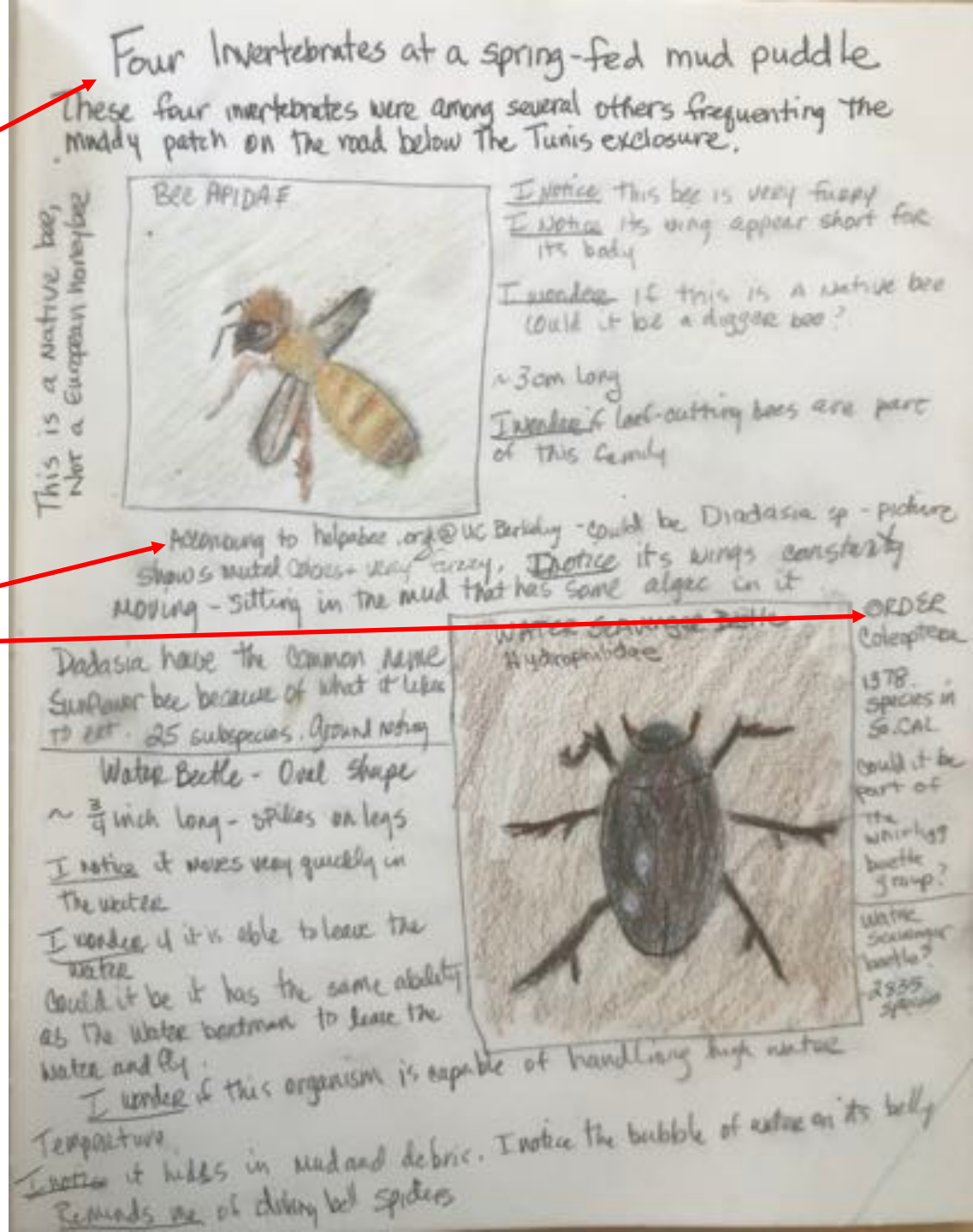
*I identified the system I studied

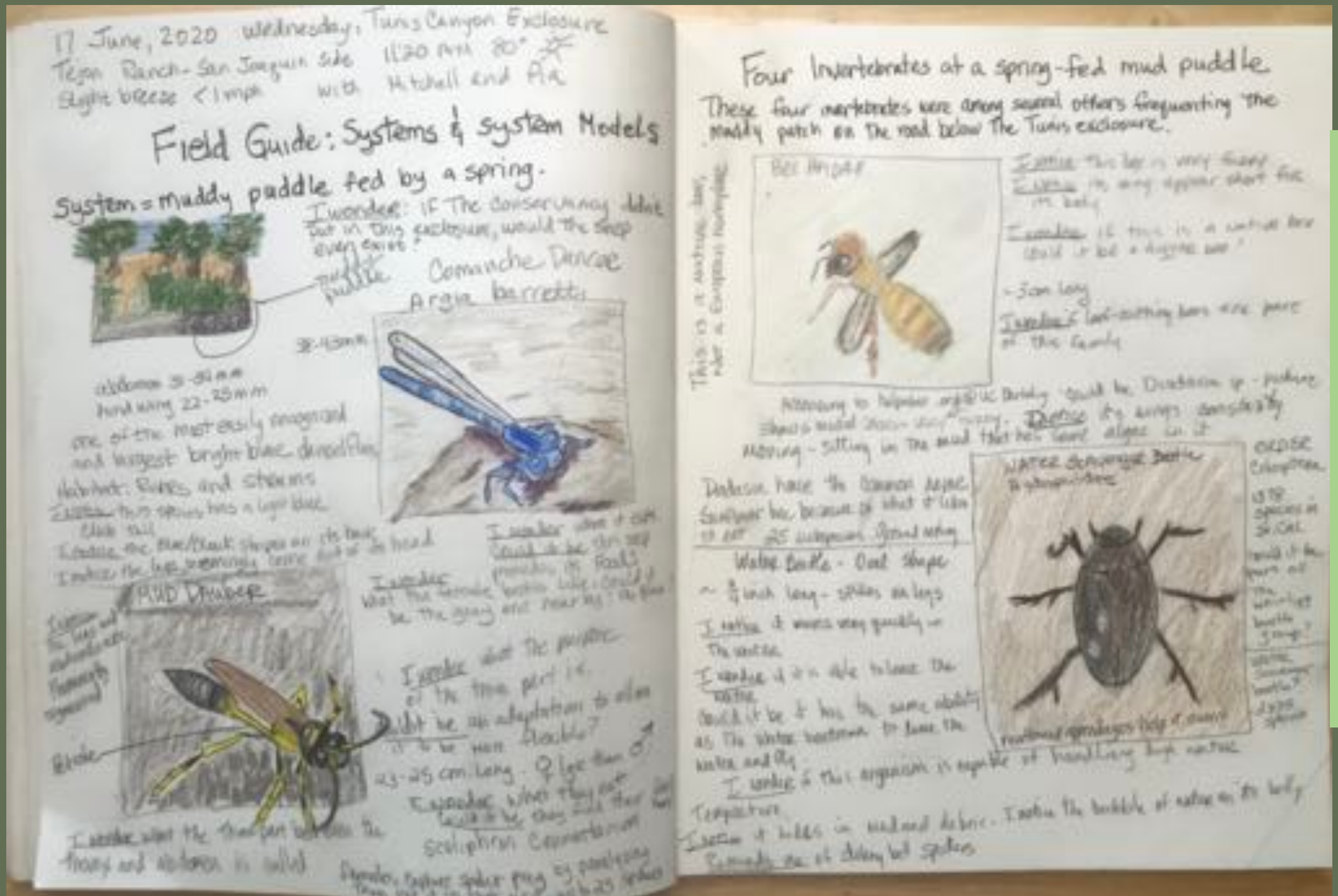
*I draw a mini-landscape circling the area of study

*Because this is about systems <u>AND</u> system models, I wrote an important “I wonder” question that ponders what would happen if there was a change in the model.

*I continued on to the second page.
*I included a sub-title that connects with the title on the previous page.

*When I got home, I did some research to identify the animals I saw and to answer some of my questions. I added that information to my journal pages including my source of information.





Because I planned out out my pages before starting my study, the finished journal entry looks attractive and balanced.

Now do your own field guide. Focus on SYSTEMS AND SYSTEM MODELS

Take about 1 hour to work on all your studies, about 15-20 minutes each.

Come back and do your reflection questions on your next page.

REFLECTION

Question/Answer	Answer	Topic Sentence	Closing Sentence
Question/Answer form (Put as many words from the question into your answer.)	Answer all questions, then put them in an order that makes sense for a paragraph.	Begin with a topic sentence (“I created a field guide focusing on SYSTEMS AND SYSTEM MODELS.”)	End with a closing sentence (“It was fun to hypothesize about the SYSTEMS AND SYSTEM MODELS of my subjects.”)

REFLECTION QUESTIONS

- What are the different things you found?
- Did you see any interactions or evidence of interactions between different organisms, or between the organisms and the environment?
- What are some other interactions you imagine might occur? (This is predicting using a system model.)
- What are the nonliving factors that affect the organisms you saw?
- How might the organisms or the interactions between them be impacted if some of these environmental conditions were to change? (This is also predicting using a system model.)

Looking Forward

Next time, we'll create a field guide focused on **Structure and Function.**

Start looking around for interesting subjects.


White-faced Ibis

BYE FOR NOW.

THANKS FOR JOINING ME.

Tejon Ranch CONSERVANCY