**Spatial Agglomeration Experiment Protocol (How to Run)**

Students receive instructions and recording sheets in advance and are told to read them.

Bring:

* copies of instructions and recording sheets
* playing cards Ace-10 all suits, full deck
* paper for marking row end locations

Room setup: Excel spreadsheet with worksheets CP1 through CP6 ready to fill in. If going to use different shape grid (different number of rows / columns), change number of rows and columns in spreadsheet (CP1 only). In the room, mark each end of each row with sheet of paper or stickie on grid location is written: A1, G1, etc. up to A5, G5. Shuffle deck(s) of cards.

If there are too few students to fill in the whole grid, make sure that the empty seats are on the edge (in column A or G), asking students to move if necessary. It’s OK to lose a whole column or row, or to have empty plots at one end or another of a row (call it mountains or something), but not OK to have an empty plot in the middle of the room.

If some students typically come to the class late it can be difficult to add them to a landscape that has already been configured. One option would be to ask students who come late to pair up with another student and to make joint decisions (and equally share any payoffs).

Give students instructions and recording sheets, and deal out cards—don’t let them pick through to choose a card, but they can look at their card and those of their neighbors. Instruct them to only discuss with each other at the designated between-round times. Ask students to record name, card number (Quality), and grid location on recording sheet.

Explain the overall idea of the game: to learn about how land conservation contracts of different kinds work. Remind them that a lucky student will get paid his/her earnings, so pay attention. Also note that if a corridor is made, moose will live (pin up cartoon moose picture); if a corridor is not made, moose will die (show cartoon dead moose picture).

Instruct students that for each round, they will make decisions individually and independently. They should write down their decisions to commit to them. For speed, we will get everyone’s decisions verbally, but they should treat this as a simultaneous game.

Go around the room to get everyone’s agricultural Quality and fill that into the spreadsheet, so they can see the layout of agricultural Qualities in the room.

Begin first round. Explain and write on board conservation payment scheme ($2/plot). Verbally ask each student his/her farming decision—go around whole room and fill in landscape plot on spreadsheet. Then manually fill in block sizes (count number of blocks of each size and fill those counts into the block count column). Then manually fill in number of corridors. The spreadsheet then calculates everything else. If there is at least one corridor, leave the live moose picture up; if not, trade it for the dead moose picture. Tell students the ESS value to fill into recording sheet, then scroll right to show everyone’s earnings and what they should fill into their recording sheet. (Scroll down / around to show individuals’ values if necessary.)

Then move on to second round. Explain and write on board new conservation payment scheme ($2/plot + $1 per contiguously conserved border). Again ask everyone’s decisions and fill in block sizes and number of corridors, and help them complete recording sheet. If there is at least one corridor, leave the live moose picture up; if not, trade it for the dead moose picture. Pause for a timed five minute discussion. Let them discuss however they like; they will likely discuss just with neighbors. Only jump in if they try to strategize future rounds. Then do the third round like the second.

Then move on to the fourth round. Explain and write on board new conservation payment scheme ($2/plot + $2 bonus for members of an eligible corridor); this may take some explaining and drawing a couple of pictures. Again ask everyone’s decisions and fill in block sizes and number of corridor. If there are multiple corridors, choose the shortest (fewest plots) corridor(s); if there are still more than one, use the random number generator to choose which one gets paid (copy and paste values to make the chosen borders permanent). Then manually enter which cells are in the corridor. If there is at least one corridor, leave the live moose picture up; if not, trade it for the dead moose picture. Help them complete recording sheet. Pause for a timed five minute discussion. Then do the fifth round.

Then move on to the sixth round. Enter number of farmers and number of bids to accept into spreadsheet. Explain and write on the board new conservation payment scheme (each of the 15 lowest bids up to the budget cap receives bid value; the rest farm instead of conserving). Ask everyone’s bid. In the spreadsheet, this will populate the conservation outcomes (which plots are chosen). Manually fill in block sizes and number of corridors. If there is at least one corridor, leave the live moose picture up; if not, trade it for the dead moose picture. See whether there is a critical tie (if there is not, then the automatically calculated ranking will choose the right number of bids). If there is a critical tie, copy all bids into the bid.tie sheet and also copy the location column, and then sort ascending by bid and then rand(); then choose the top 15 and inform the students who won the auction. Go back to the main sheet and manually fill in 1 for the tie winners. Check to make sure the bid cap is not exceeded; if it is, manually change the top bidder(s) to be not accepted. Help students complete recording sheet.

Close with discussion, prompted by questions like:

* How did you make your decisions?
* Did you think that you and others made the best decisions?
* Precisely how are externalities creating inefficiency here?
* What are the pros and cons of the different conservation payment schemes we tried here?
* In this context, identify the costs and benefits of conservation. How can conservation policy weigh them against each other? What is the nature of the tradeoffs we have to think about here, or should we even think about trading things off in this setting?
* Are these conservation payments “Pigouvian,” in the sense that they optimally correct for an externality? What are the pros and cons of Pigouvian versus non?
* What about government conservation budget—should we be concerned about paying out too much? How would we incorporate a government budget constraint?

At the end of class, pick a student to “win” (be paid). Go to the Summary sheet. Delete rows that correspond to subject plots that did not have a farmer. Explain that a random number generator will choose a person and a contract period to pay when you type something in a cell. Build up some suspense and then type anything anywhere to get the random number generators to generate new numbers. Declare the winner and the amount, and pay in cash immediately.

Save the spreadsheet with the data and post to the course website so that students can see it. Students can keep instructions and recording sheets.