

Converting Simple SD Models into Games

Presentation to the CLEX

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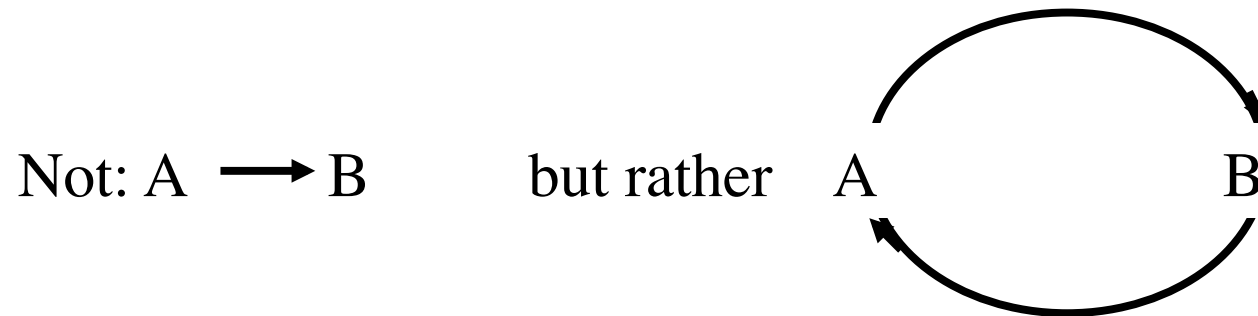
Your Goals for this Session

- Why did you decide to take this workshop?
- What would have to be accomplished here this afternoon in order for you to decide that the session was a great success?

Survey of Your Game Experiences

- Who has played the Beer Game?
- Who has facilitated the Beer Game in teaching?
- Who has played FishBanks; used it in teaching?
- STRATEGEM? Other SD games?
- Who has used a flight simulator
- Who attended a session by Linda and me demonstrating games from the *Systems Thinking Playbook*?
- Who has used one or more the *PlayBook* exercises?
- Who has designed their own systems game?

The Foundation of SD



Structure \Leftrightarrow Behavior

Causal Loop
Diagrams;

Flow Diagrams

Reference Mode
Diagrams;

Simulation plots

Key Concepts in Systems Thinking

- Conceptual boundary - space & time
 - Time horizon
 - Behavior over time graph
- Patterns of behavior - growth, decline, etc.
- Causality - positive, negative, delays
- Feedback, archetype - emergent behavior
- Structural change, policies, leverage
- Life as learning - mistakes in perception, communication, analysis; thus experimentation

The Ways of a Systems Thinker

- Respects how mental models influence what we see
- Changes perspectives to see new leverage points
- Looks for interdependencies
- Perceives and respects the long-term and the environment
- Expects the “unexpected
- Focuses on system structure, not on culprits
- Holds the tensions of paradox and controversy without trying to resolve them quickly
- Seeks to experiment
- Uses a library of archetypes as analogies.
- Gives up control; seeks learning.

Modes of Experiential Learning

- Internships
- Team projects
- Case studies
- Adventure initiatives
- Videos
- Simulations
- Stories
- Theater
- Games

Game:

a contest with rules, the result being determined by skill, strength, or chance

a voluntary activity or occupation executed within certain fixed limits of time and place, according to rules freely accepted by absolutely binding, having its aim in itself and accompanied by a feeling of tension, joy, and consciousness that is different from ordinary life

a game is an *activity* among two or more independent *decision-makers* seeking to achieve their *objectives* in some *limiting context*.

Outline of the Session

- History of gaming in SD, development of the Playbook
- The nature and function of games
- Examples of games in relation to the elements of systems thinking
- Framing and debriefing
- Designing games to complement the formal course.

The Functions of Games

- Provide entertainment, create motivation, release energy
- Team building - communication and negotiation skills, trust
- Build a shared vocabulary, establish metaphors
- Teach the relation between structure and behavior
-make archetypes real
- Establish the relative effectiveness of alternative decisions; test the level of understanding
- Provide scenarios of the future.

Using Games for Learning

- Create a frame for the experience
- Be very precise about the goals and rules
- Carry out the exercise
- Debrief

Games: Before or After the Lesson

- **Exploration:** participants have little or no advance preparation; they simply discover the issues and behaviors that emerge from a specified set of goals, roles, and rules. Often they fail to achieve the goals.
- **Confirmation:** participants learn first the potential problems and the principles for successful adaptation; they apply their knowledge to the game and generally succeed.

Debriefing/Learning Cycle

- What happened in the game?
- Do you see these behaviors in real life?
- What structure in the game produced the results?
- Do those structures exist in real life?
- How would you change the structure of the game to produce better results?
- What would be the corresponding changes in the real system?
- How can we attain the commitment and expertise to make the changes?

Elements of a Game

- Frame, scenario
- Pulse
- Cycle Sequence
- Steps of Play
- Rules
- Roles
- Model
- Decision Sequence
- Accounting System
- Indicators
- Symbology
- Paraphernalia

Three Types of Frames

The frame is the story, or scenario, used to establish a context for the game. It guides the participants in choosing the elements of their own past experience to bring into the exercise. It sets the stage for applying the lessons.

- **Isomorphic:** replicates the same or similar characteristics of the participants's organization.
- **Universal:** references an everyday life situation or event that could apply to anyone in the group, but is not necessarily group or organization specific.
- **Fantastical:** involves something completely out of the ordinary, perhaps unreal but understandable and relateable. The frame may be verbal, graphic, video, other.

Factors Affecting Game Use

- Precise goals for the experience.
- Group size and quality - intact team or unrelated.
- Physical characteristics of the space - noise, open area, other people present, distractions, play area.
- Length of time - one block or broken up.
- Availability of supporting technology: flip charts, VCR, computers, OH projectors, training elements.
- Participants' prior knowledge or preparation.
- Number and skill level of the facilitator(s).
- Time and money available.
- Attitude of the facilitator.

Creating a Learning Environment

- Create a space and a schedule that leaves each participant in interactive mode.
- Share the underlying principles of the design.
- Respect diverse backgrounds and learning styles.
Always be concerned about safety - physical and psychological.
- Have them check in and consider a group contract.
- Provide participation options.

An Effective Game Is:

- Multi person
- Iterative
- Mechanically simple
- Fun
- Challenging -> satisfaction in success
- Not dominated by chance
- Related to important issues
- Transferable
- Open to all participants

Levers for Changing the Behavior of Systems

- Change the numbers
- Restructure material stocks and flows
- Add negative feedback loops
- Add positive feedback loops
- Improve information flows
- Change the rules
- Enhance capacity for learning
- Alter the goals
- Change the paradigm
- Enhance the capacity for altering paradigms

A Guide for Game Operators

- Be clear about your pedagogical purposes,
- Show respect for the game and the players,
- Integrate the game with other materials,
- Be familiar enough with the game that you can run it well (Rule of 10)
- Be sure you have adequate personnel to run the game
- Make up a realistic time schedule.
- Prepare all materials; decide which to distribute ahead of time.
- Prepare the space and furniture arrangement.
- Decide on your policy regarding visitors.

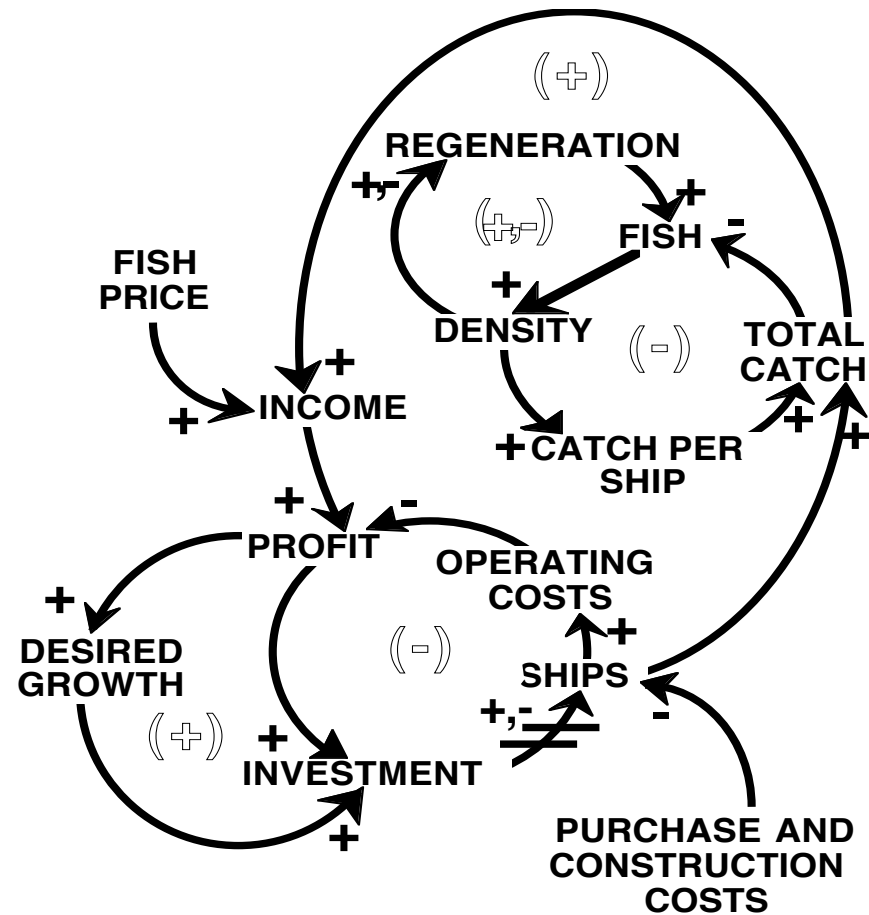
Sources of Games

- Scannell, E.E. & J.W. Newstrom, *Games Trainers Play*, (4 in the series), McGraw-Hill, New York, 1983-1991
- Jossey-Bass/Pfeiffer Publishing (800-274-4434) or <http://www.pfeiffer.com>
- Crisp Publications (800-442-7477) or <http://www.crisp-pub.com>
- *Simulation & Gaming*, Sage Periodicals Press, Thousand Oaks, CA (805-499-0721)
- Interact (800-359-0961)

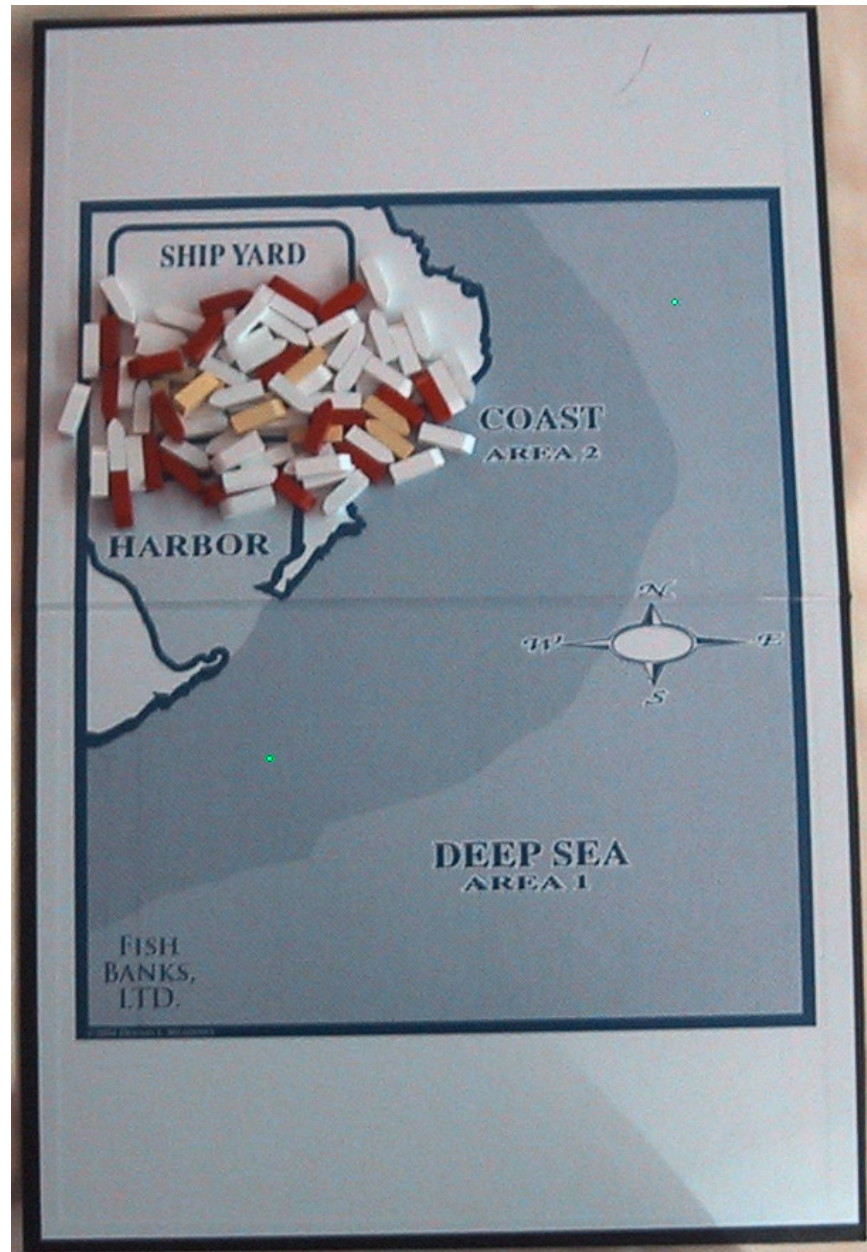
Three Games About Renewable Resources

- FishBanks
- Harvest
- Take What You Can

The Fisheries System Structure



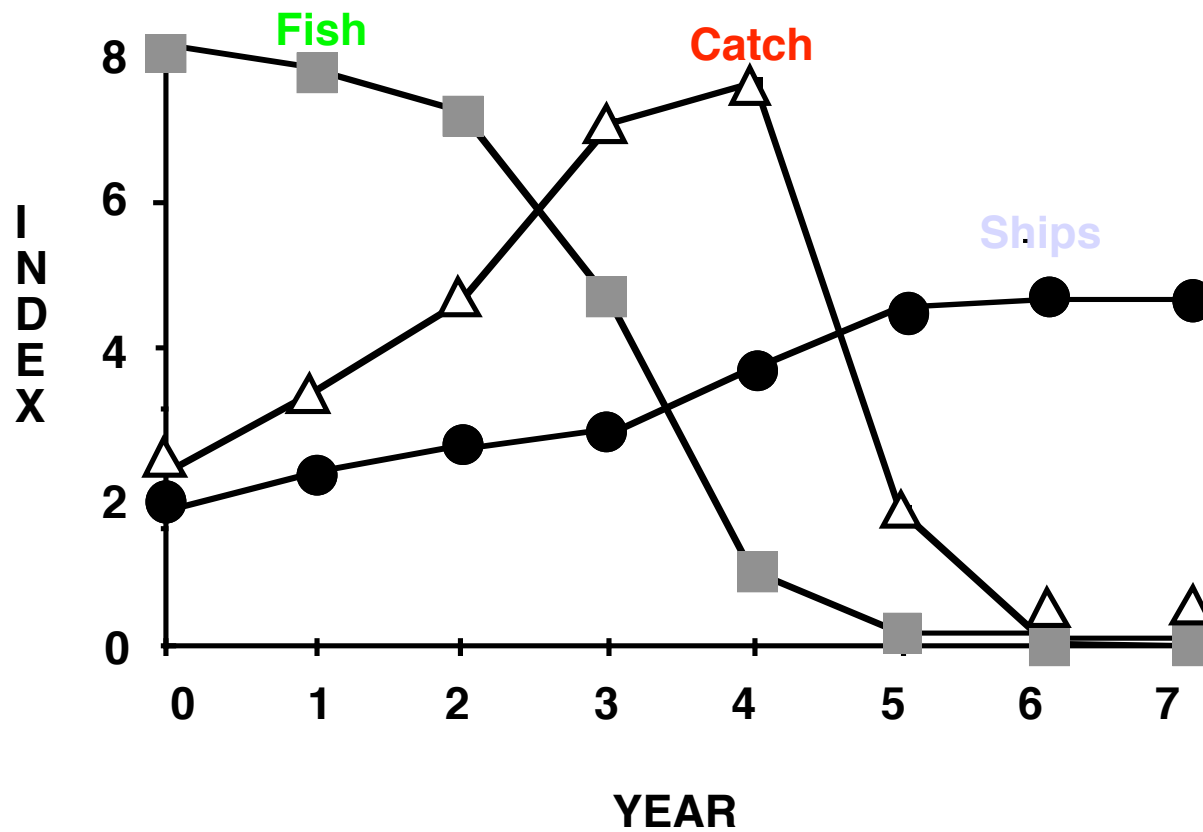
Fish Banks, Ltd Materials



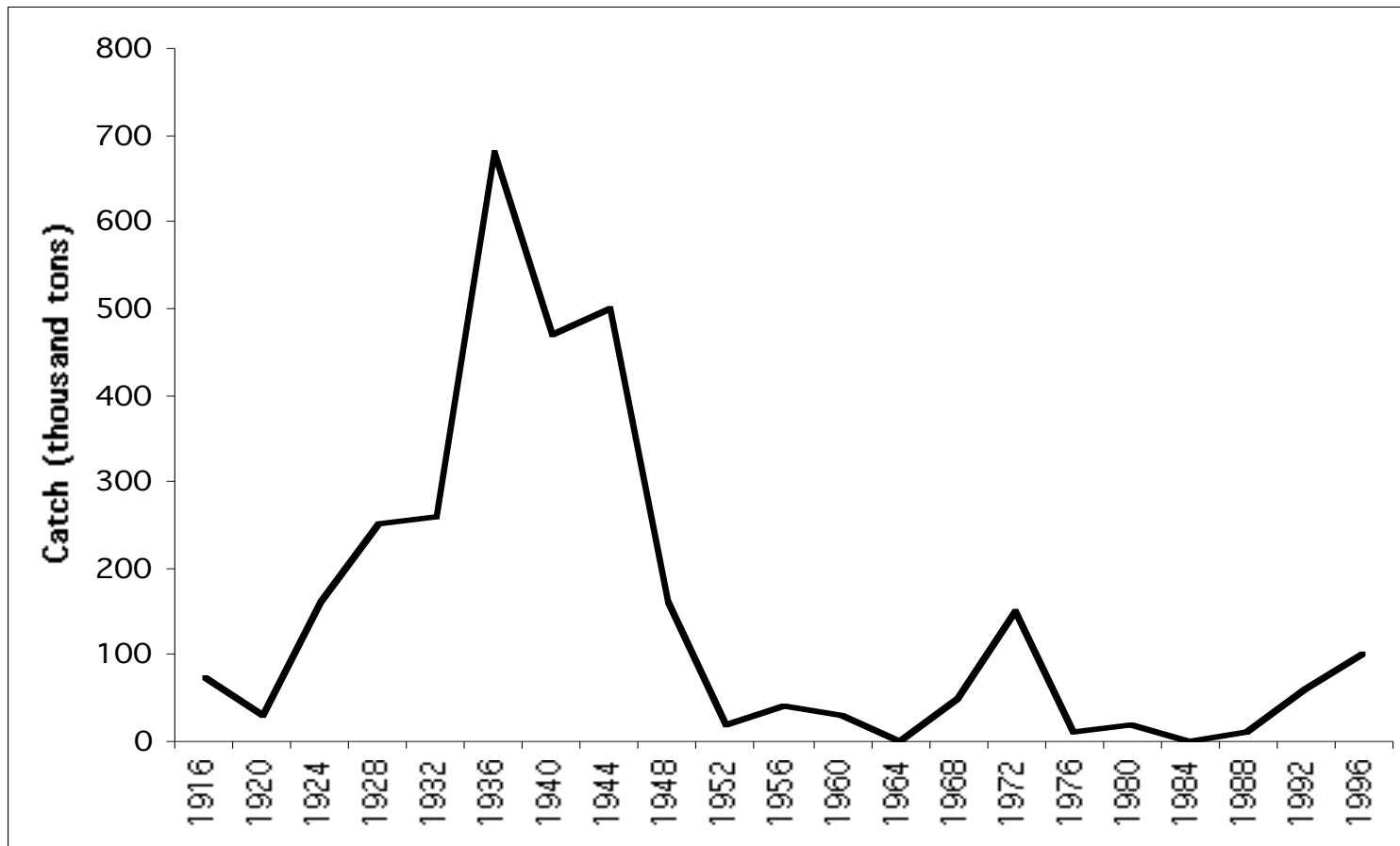
FishBanks Issues

- Regeneration of renewable resources
- Investment strategy, short-term, long-term tradeoffs
- Role of the market and psychology in governing resource use. Relation of game events to real life.
- Impact of technological advance
- The effect of simple feedback structures on behavior; alternative conservation strategies.
- Teamwork, negotiation, strategy formulation, monitoring effectiveness

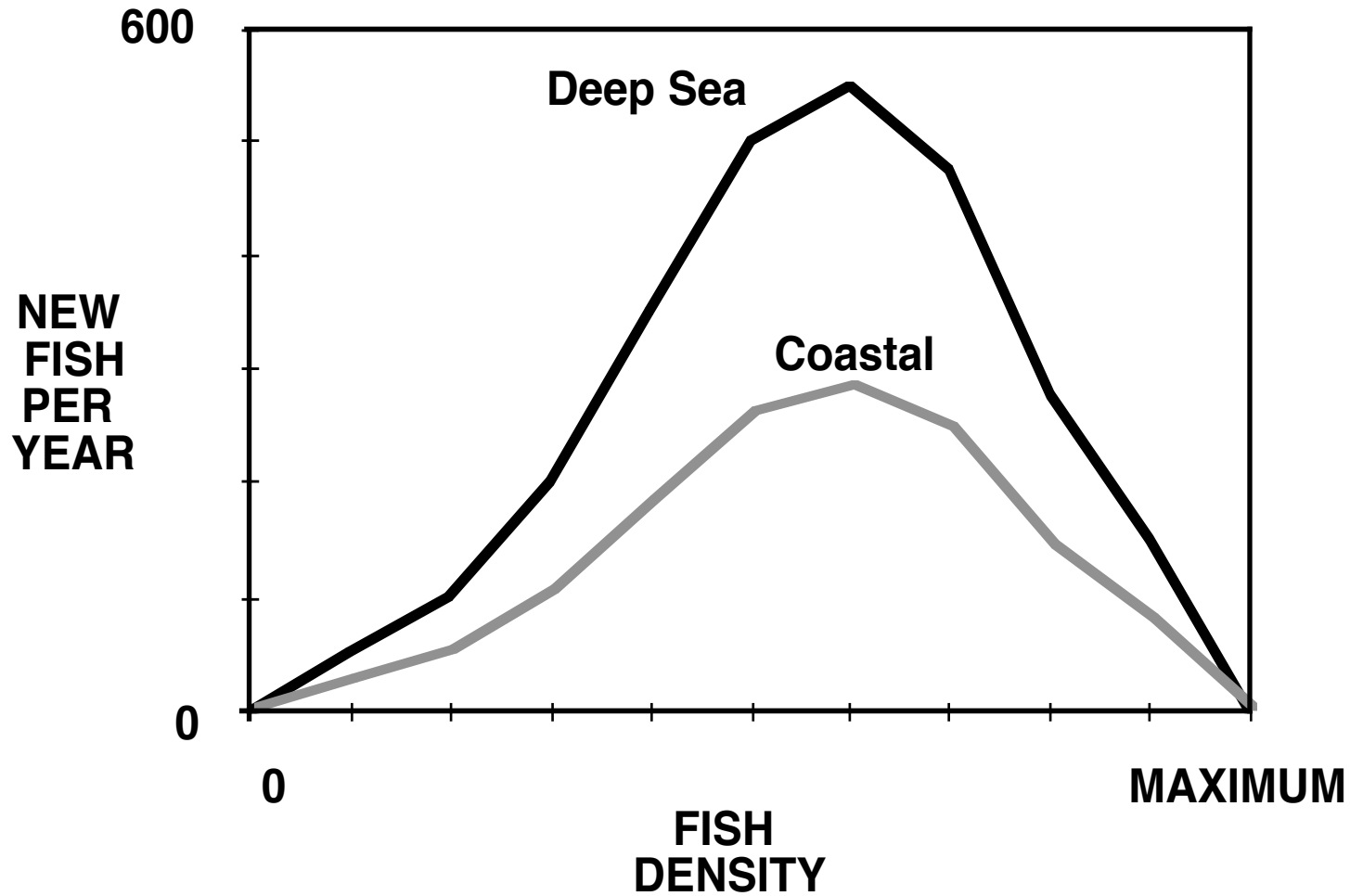
Typical Game Behavior



Pacific Sardine Catch



Regeneration of Fish



Decision Sheet

Fish Banks, Ltd. Company: <input type="text"/>											
DECISION SHEET											
Annual Report											
	Year	1	2	3	4	5	6	7	8	9	10
R:1	Deep Sea Bank Catch (# fish last year)										
R:2	Coastal Bank Catch (# fish last year)										
R:3	Price of Fish (\$ / fish last year)										
R:4	Total Fish Sales (\$ last year)										
R:5	Interest (\$ last year)										
R:6	Initial Bank Balance (\$ this year)										
R:7	Ship Fleet Before Auctions and Trades										
Auction, Trades, & Orders											
	Year	1	2	3	4	5	6	7	8	9	10
D:1	Ships Purchased in Auction										
D:2	Money Spent on Auction Purchases										
D:3	Ships Purchased In Trades										
D:4	Money Spent on Trade Purchases										
D:5	Ships Sold in Trade										
D:6	Money Received from Trade Sales										
D:7	New Ships Ordered										
Ship Allocations											
	Year	1	2	3	4	5	6	7	8	9	10
D:8	Ship Fleet after Auctions & Trades										
D:9	Ships Sent to Deep Sea Bank										
D:10	Ships Sent to Coastal Bank										
D:11	Ships Remaining in Harbor										

FishBanks Steps of Play

1. Receive computer printout and record on decision sheet under "Annual Report."
2. Collect ships and money.
3. Bid for auctioned ships, if there is an auction.
4. Buy or sell ships in trading session.
5. Place orders for new ship construction.
6. Calculate and record fleet size.
7. Allocate ships among fishing areas and harbor and record decisions on Decision Sheet.
8. Place ships on game board.
9. Give Decision Sheet to operator.

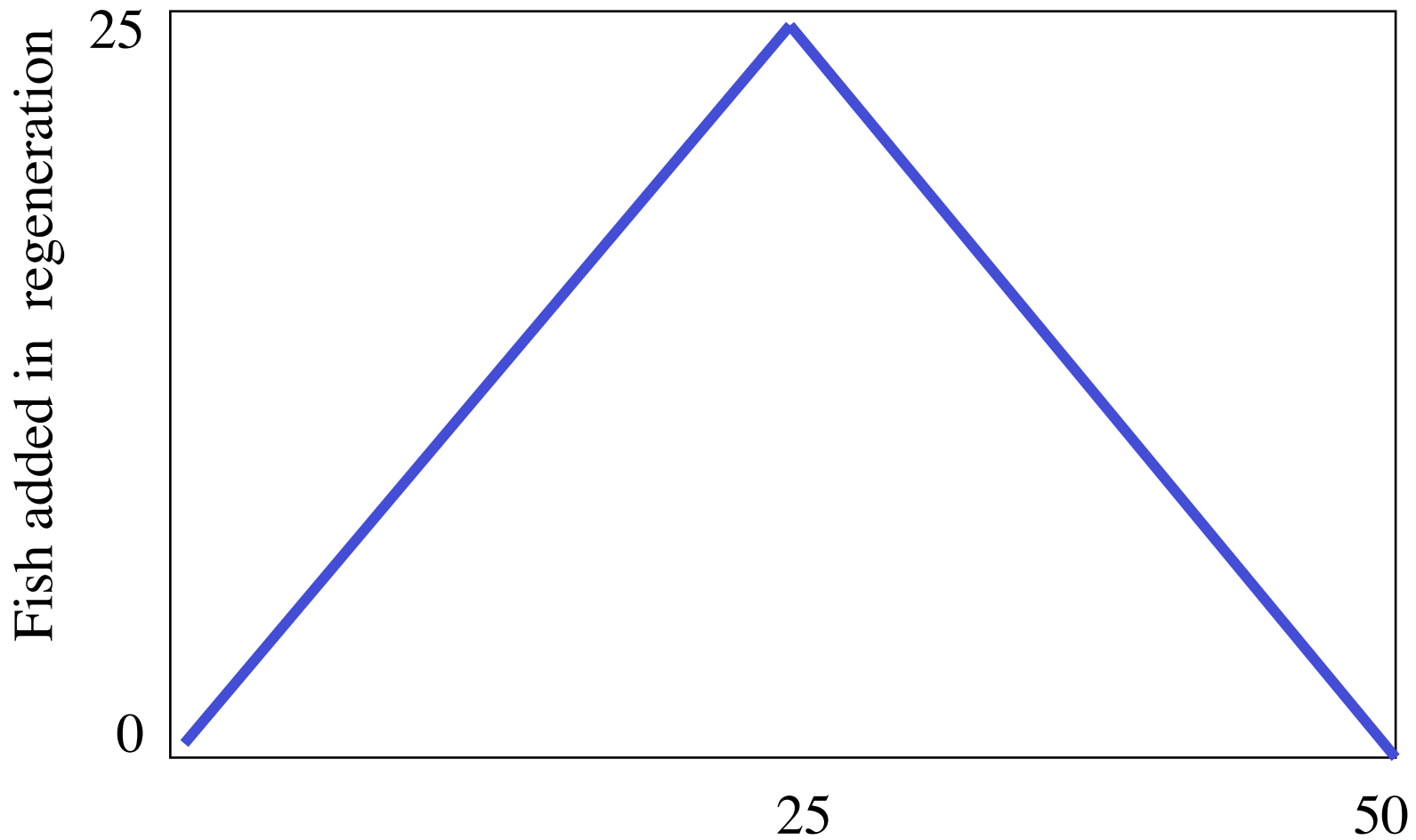
Harvest Steps of Play

1. Each team decides how many fish it will request for this year, writes the number on a slip of paper, and submits its order.
2. Operator allocates the available fish.
3. Teams retrieve their “ships”
4. Operator replenishes the fish.

Harvest Issues

- Regeneration of renewable resources, maximum sustainable yield
- Short-term, long-term tradeoffs
- Role of the market and psychology in governing resource use.
- Teamwork, negotiation, strategy formulation, monitoring effectiveness

Regeneration of the Sea



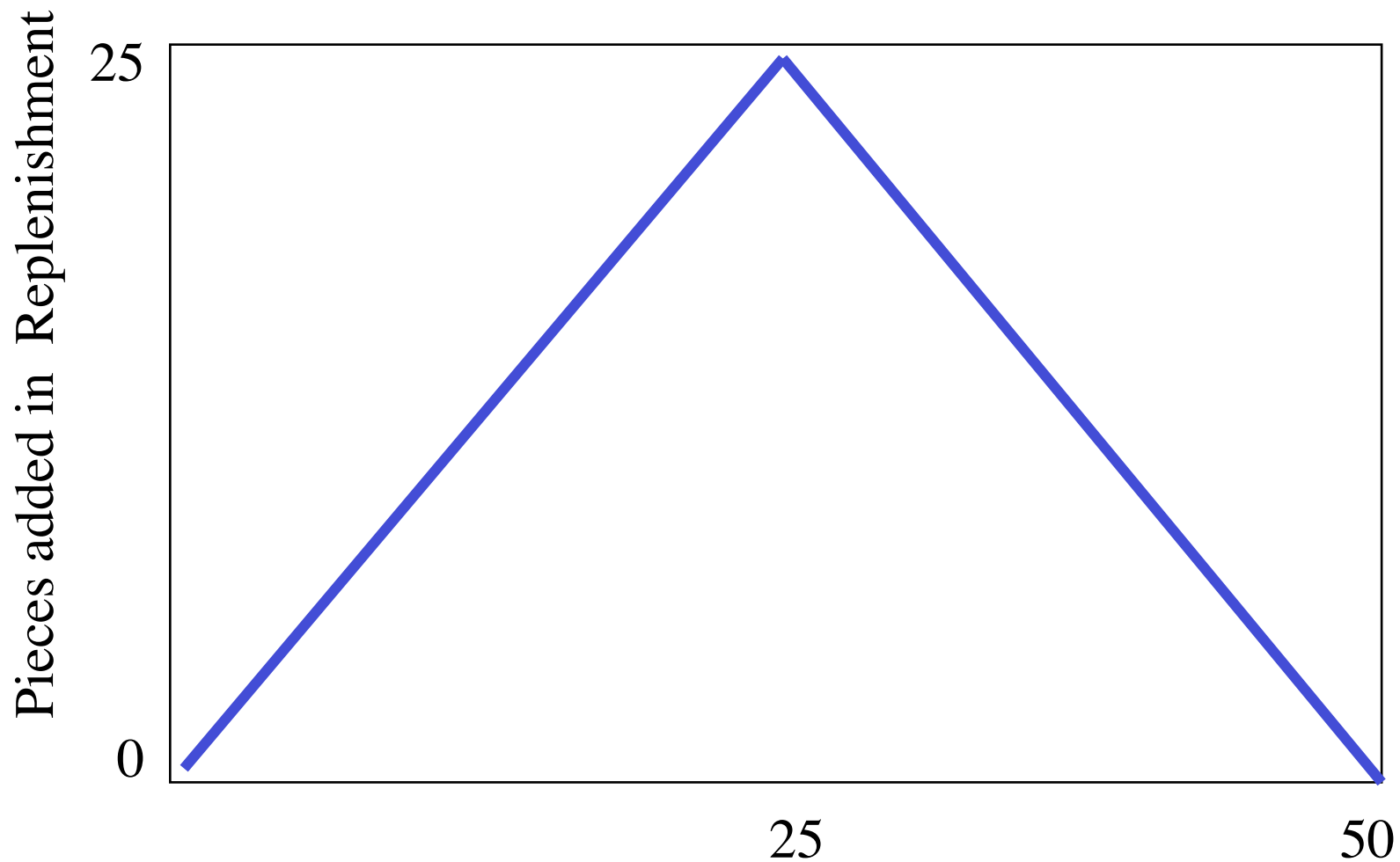
Fish after harvest, before regeneration

Take What You Can

Steps of Play

1. Each team decides how many pieces its delegate should take.
2. Operator sounds the whistle.
3. Delegates take their order, or whatever they can get.
4. Operator replenishes the stock of pieces.

Replenishment of the Pieces



Pieces after taking, before replenishment