Name: _____ **Date:** _____

Section: _____

Natural Selection Island Simulation Activity

Modeling Natural Selection on Island Populations

Phase 1: ENGAGE (3 minutes)

Getting Started: Open peebedu.com and navigate to Natural Selection Island Simulation

Click '`Introduction`' to understand the simulation.

Initial Understanding:

- How many islands? _____

- Insect colors available: _____

Essential Question: How do separated populations evolve differently under various selection pressures? _____

Phase 2: EXPLORE (10 minutes)

Investigation A: Natural Selection in Action

Use default settings and click '`Start`'. Observe for ~200 frames.

Pattern Recognition:

- Which insects dominate on the green island? _____

- What happens to mismatched colors? _____

Migration Observations:

- Do insects move between islands? YES / NO

- What affects survival during crossing? _____

Investigation B: Changing Conditions

Reset and try these changes:

Reduce Water Survival (to 0.5):

- Islands become: MORE / LESS connected
- Populations become: MORE / LESS isolated
- Evolution happens: FASTER / SLOWER on each island

Increase Red Island Selection Strength (to 10):

- Non-red insects on red island: INCREASE / DECREASE
- Red population becomes: MORE / LESS pure
- Time to reach color dominance: FASTER / SLOWER

Phase 3: EXPLAIN (8 minutes)

Understanding the Mechanisms

Selection Pressure: Each colored island favors matching insects. This demonstrates:

Gene Flow Impact: When water survival is HIGH:

- Populations: MIX / STAY SEPARATE
- Evolution: SPEEDS UP / SLOWS DOWN
- Islands become: MORE / LESS similar

When water survival is LOW:

- Each island evolves: INDEPENDENTLY / TOGETHER
- Unique populations: DEVELOP / DON'T DEVELOP

Generalist vs Specialist: Black insects survive on green AND brown islands. This strategy is: RISKY / SAFE Because: _____

Founder Effect Connection: If only a few insects reach a new island, the population will: _____

Phase 4: ELABORATE (3 minutes)

Real-World Applications

Darwin's Finches: How does this simulation model the Galápagos? _____

- Islands = _____

- Result = _____

Conservation Biology: Habitat fragmentation is like lowering water survival because: _____

Antibiotic Resistance: If islands were '`hospitals and colors were resistance traits`':

- Migration would represent: _____

Phase 5: EVALUATE (1 minute)

Quick Assessment

Key Concepts: Match the observation to the evolutionary force:

- Red insects increase on red island: _____

- Insects move between islands: _____

Options: Natural Selection, Mutation, Gene Flow

Prediction:

If you made all islands the same color, what would happen? _____

- –

Reflection: How does geographic separation lead to evolution of new species? _____