# Resting

## Definitions:

**Resting-** A behavioral state during which fish reduce movement and metabolic activity to conserve or recover energy.

**Staging-** A temporary holding behavior in preparation for a future movement event, such as spawning or migration.

**Stress-** a physiological response to a challenge or disturbance that disrupts the fish's internal balance, or homeostasis.

**Selective Tidal Stream Transport (STST)-** A movement strategy where fish use specific tidal phases to move efficiently through the estuary while minimizing energy expenditure.

## Description of Process:

Resting is a critical behavioral function that allows fish to pause, recover energy, and make decisions about when and where to move next. It may occur during periods of unfavorable environmental conditions, after energetically costly behaviors like migration or spawning, or as part of staging before an upcoming event. Resting areas are often low-velocity zones that provide shelter from currents and predators.

Environmental stressors such as salinity stress and thermal stress often trigger resting. Fish may stop or slow movement to acclimate physiologically before continuing. Resting is especially important for species using selective tidal stream transport (STST), where timing and energy conservation are key. During ebb or flood tides, fish may stage in place until the optimal flow phase occurs.

Different species use resting for different purposes. Some rest to acclimate to salinity or temperature shifts during migration. Others rest between movement phases as part of an energy management strategy. Juveniles may rest more frequently due to limited swimming capacity or sensitivity to environmental changes.

In modeling, resting behavior should incorporate environmental thresholds, species-specific recovery strategies, and spatial access to low-energy zones. Resting affects the timing of behaviors like spawning or migration and can shape cumulative exposure risk if resting overlaps with contaminated areas.

## Little Facts:

- Resting often occurs near channel edges, behind structure, or in backwaters with low velocity.
- Salinity and temperature changes can slow fish movement as they pause to acclimate.
- Staging fish may stay in the same location across several tidal cycles while preparing to spawn or migrate.
- STST relies on periods of low activity between directional tidal movements.
- Fish in poor condition may rest more frequently or for longer durations.
- Resting in contaminated or hypoxic areas can increase stress or exposure risks.
- Not all resting is passive. Some fish exhibit alert but stationary behavior to conserve energy while remaining responsive.

## Discussion Objectives:

- Is this function accurate and realistic to your knowledge?
- Which species in the model use staging or STST behaviors?
- What environmental conditions most often trigger resting (e.g., salinity, temperature, discharge)?
- Where in the system do you expect key resting or staging locations for different species?
- What kind of model outputs should reflect resting behavior?
    - Are fish delaying movement or migration due to stress or suboptimal conditions?
    - Are resting areas aligned with habitat refugia or zones of increased risk (e.g., contaminants)?
    - Do rest periods vary by species, energy status, or environmental exposure?