

Basic Drift Theory

**Your Guide to Successful Search and
Rescue Planning**

National SAR School

Objectives:

- Understand drift forces
- Apply the Search Plan Decision Matrix

References:

Chapter 5, National SAR Manual

Chapter 2, Coast Guard Addendum to the National SAR Manual

Course Notebook

Review

What are the 5 SAR Case Stages?

- ✓ Awareness
- ✓ Initial Actions
- ✓ Planning
- ✓ Operations
- ✓ Mission Conclusion

Review

When you first become aware of a SAR incident, what are the most important questions to ask?

- ✓ **Type of Incident**
- ✓ **Location and Time**
- ✓ **Search Object Description**

A Boater is having a bad day...

I wish someone
would send help!



What is Datum?

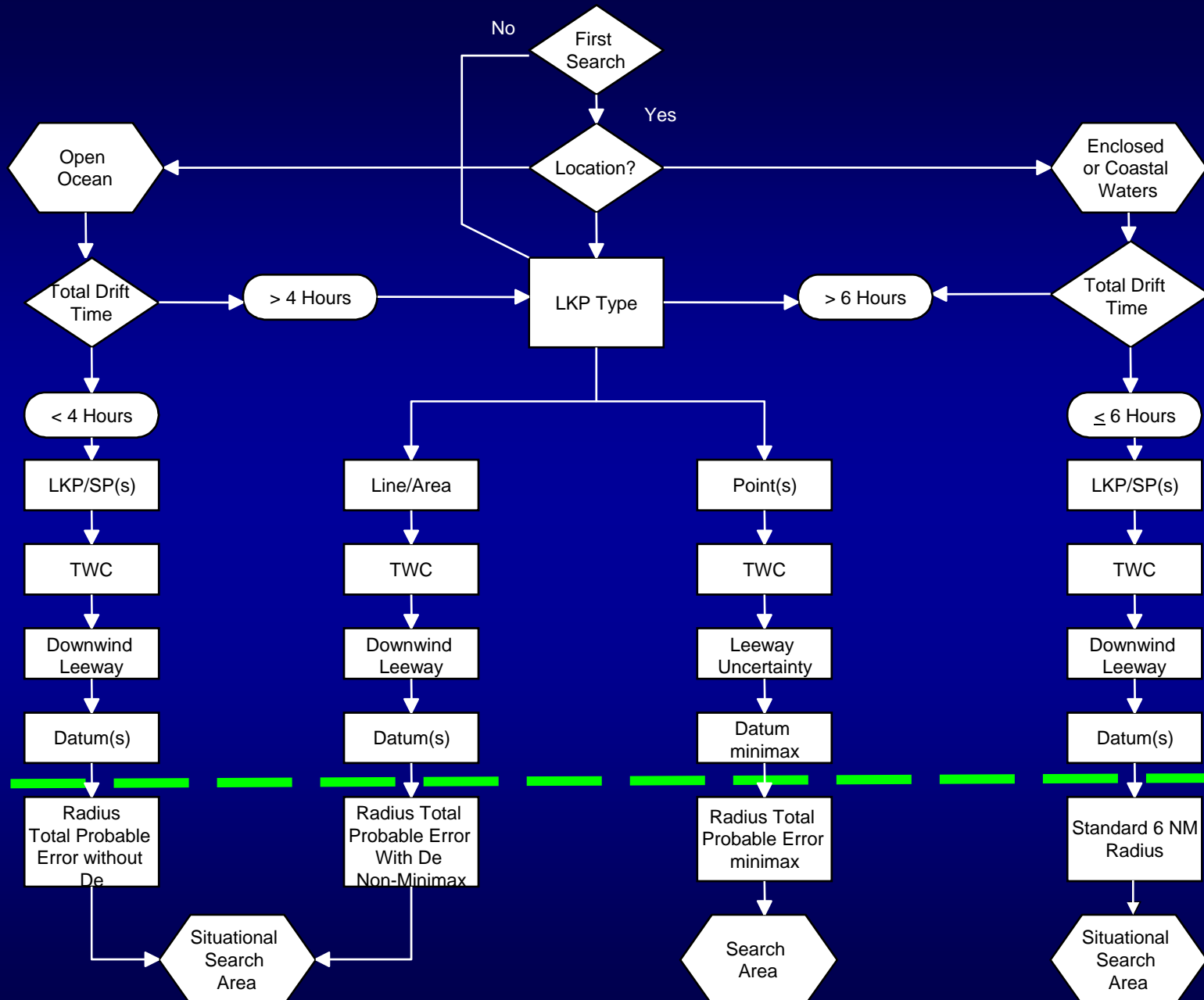
“The most probable location of the search object, corrected for movement over time.”

What is Datum?

Where will they drift to?

**Right about here.
That's DATUM!**





Search Plan Decision Matrix

Automated Manual Solution

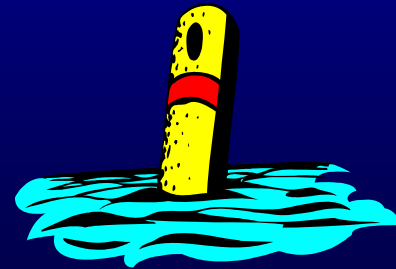
- **Based on mathematical models which quantify the drift factors.**
- **What are those drift factors?**
 - **Total Water Current**
 - **Leeway**
- **Drift forces are expressed as vectors**
- **Vectors are added together to determine datum.**

Total Water Current

7 Individual Currents

- Sea Current
- Wind Current
- Tidal Current
- Longshore Current
- River Current
- Lake Current
- Surf and Rip Currents

Data Marker Buoys



Wind Current

Generally...

- ❖ **> 20 nautical miles off shore**
- ❖ **Water depth > 100 feet**

Sea Current

Generally...

- ❖ **> 25 nautical miles from shore**
- ❖ **Water depth > 300 feet**

Tidal Current

Generally...

- ❖ **Coastal Waters**
- ❖ **“Typically” within 3 nautical miles from shore.**
- ❖ **Changing direction and speed**

Leeway is ...

Movement caused by winds blowing against the exposed surfaces of the search object.



Important Note!

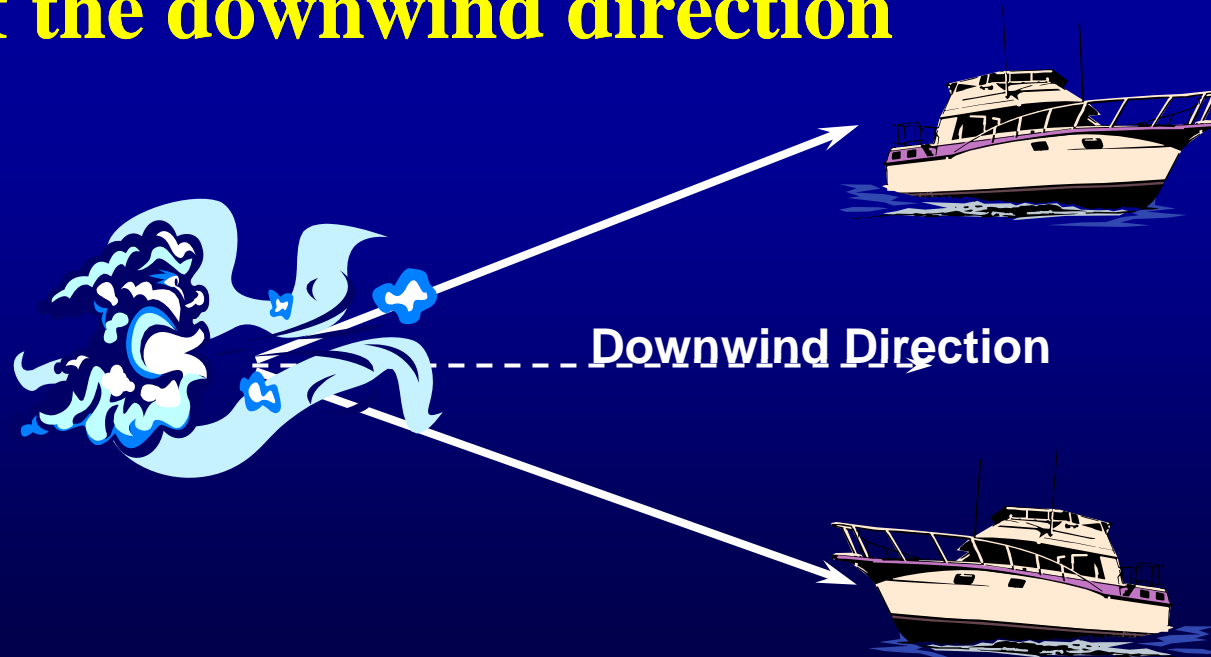
- **We now use only two leeway types:**
 - **Downwind**
 - **Directional Uncertainty**

Downwind Leeway

- **Legs 1, 2 and 4 of the Matrix.**
- **Leeway direction is reciprocal of wind direction.**
- **Leeway speed is a percentage of wind speed.**
- **Leeway Taxonomy provides the speed formula.**

Directional Uncertainty

- **Leg 3 of the Matrix**
- **Also called “Divergence”**
- **Lack of symmetry deflects the object off the downwind direction**



Drift Vectors are expressed as:

A Direction **065 Degrees**

And

A Magnitude **2.2 NM or .8 KTS**

Adding Drift Vectors

- **Each vector has a direction & distance**
- **Can be added on a**
 - **Chart**
 - **Maneuvering board**
 - **Calculator**
- **Total Water Current + Leeway = Datum**

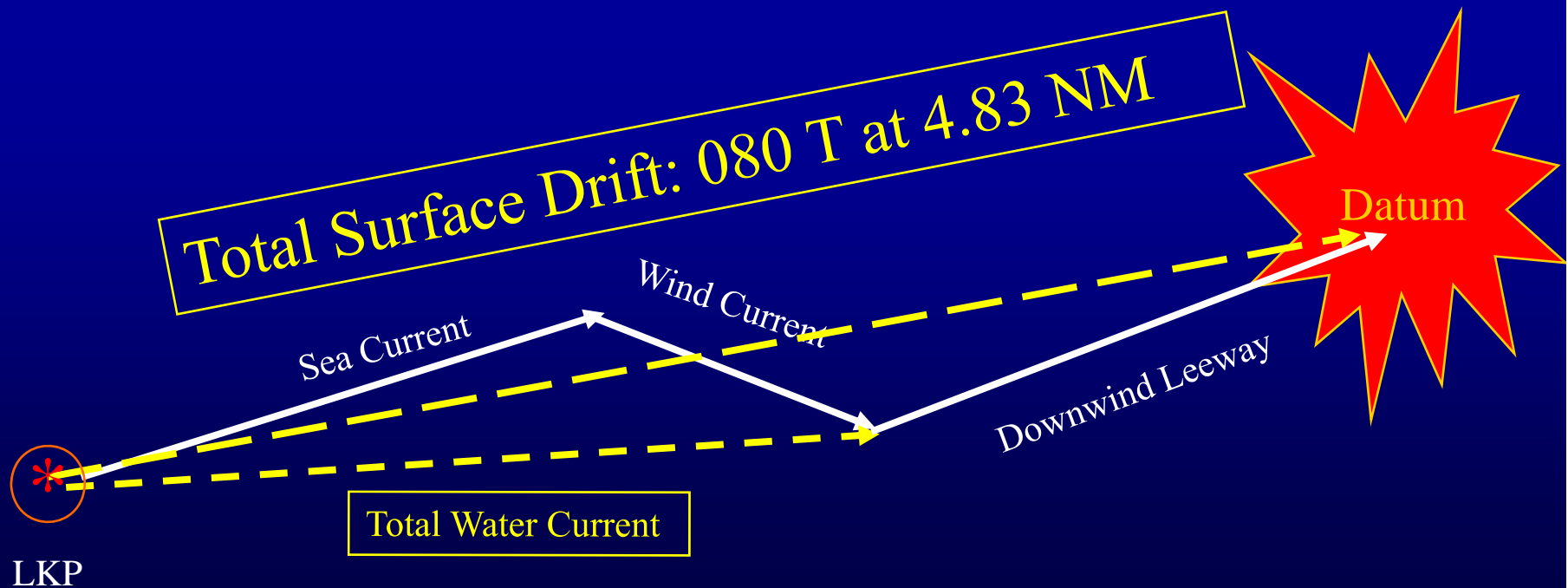
Adding Drift Forces

For Example:

Sea Current: 070 T at 2.0 NM

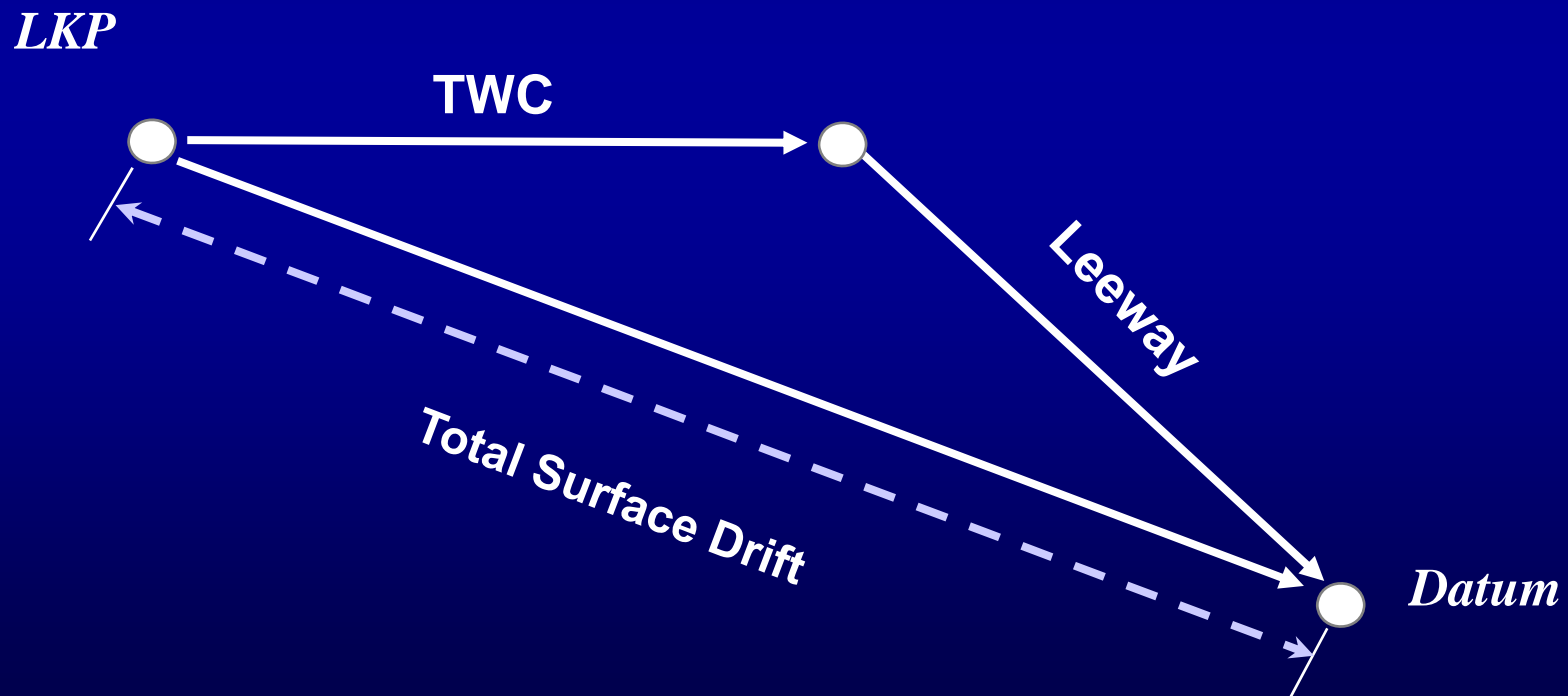
Wind Current: 110 T at .82 NM

Downwind Leeway: 050 T at 2.3 NM



Legs 1 and 4

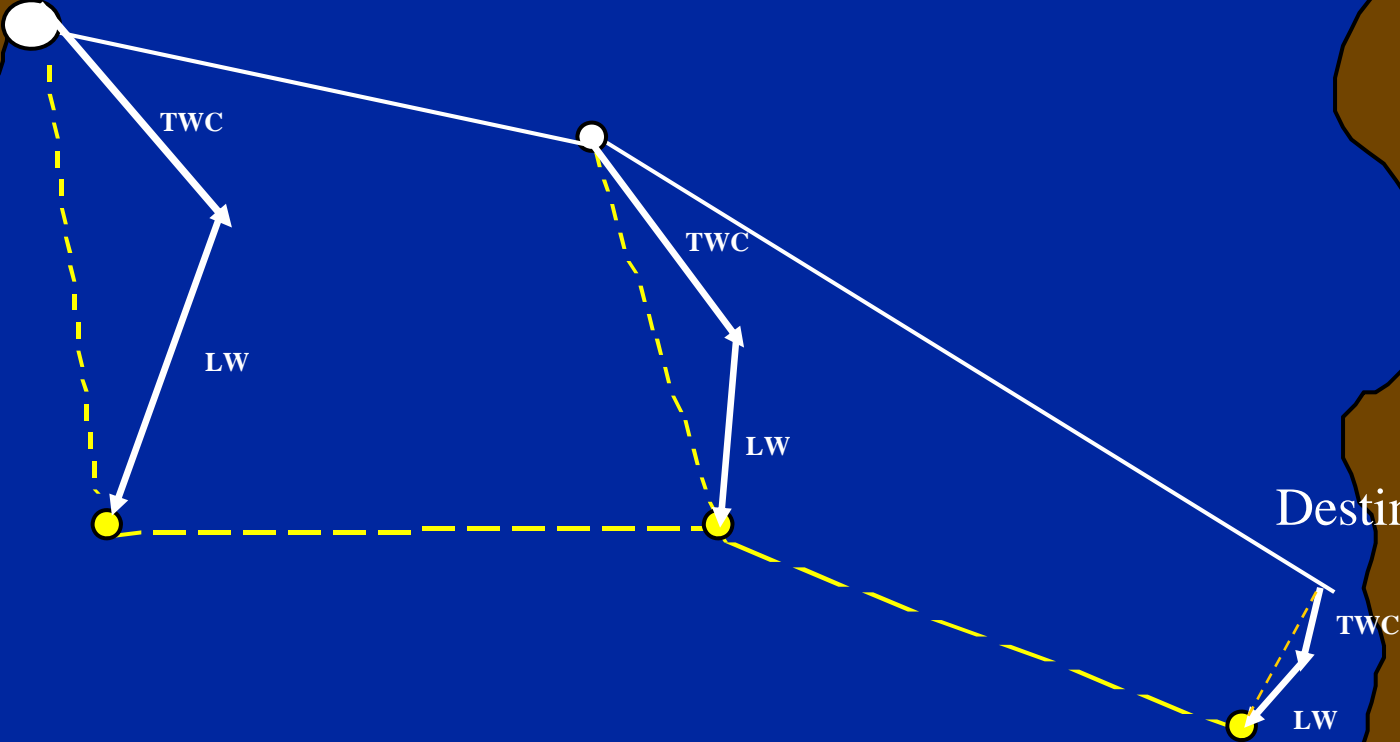
**Oceanic, 4 hours or less, or
Coastal 6 hours or less drift**



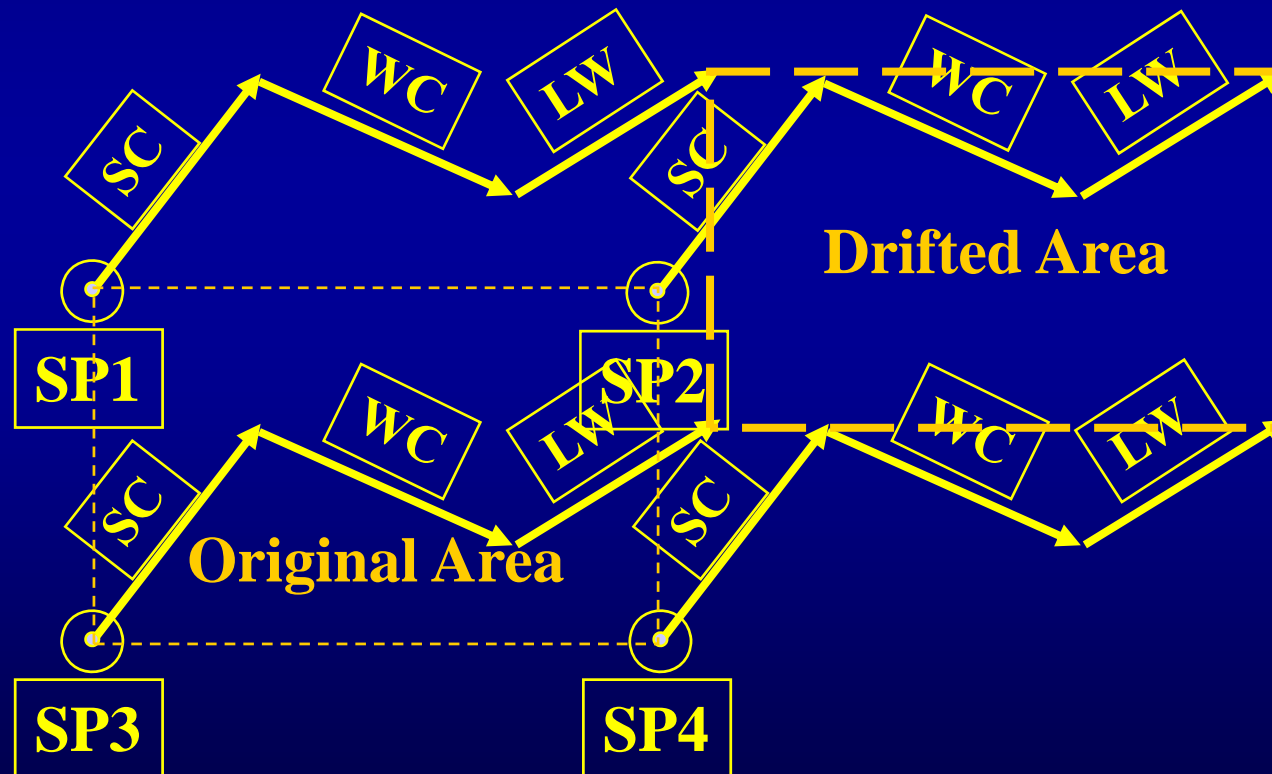
Leg 2 (Line)

Origin

Destination



Leg 2 (Area)



Leg 3

**Oceanic, more than 4, or
Coastal, more than 6 hours, or a
Subsequent Search; Point(s)**

Datum_{minimax}

**Datum point established midway between
the minimum drift position (D_{\min}) and the
maximum drift position (D_{\max}).**

Leg 3

Oceanic, more than 4, or
Coastal, more than 6 hours, or a
Subsequent Search; Point(s)

