



Guidance for Dispersant Decision Making:
Potential Impacts on Aquatic Biota

Draft Field Guide

Written by:
Dr. Deborah French McCay
Applied Science Associates, Inc. (ASA)

for
The Coastal Response Research Center



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Executive Summary

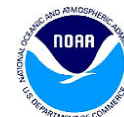


This field guide summarizes results available in the Oil Spill Impact Guide (OSIG) which is based on a matrix of 1,080 oil fate and exposure model runs using Applied Science Associate's (ASA) Spill Impact Model Application Package (SIMAP) physical fates, exposure and oil toxicity models. The model application simulated in the OSIG field guide is for the surface mixing layer of open unrestricted water bodies, as opposed to near shorelines. Model results, including water volume where acute toxic effects would occur and the area of water surface oiled (which would impact wildlife, as well as socioeconomic uses), are summarized here in chart format.

Impacts for treated oil volumes < 1,000 gal (3.8 m³) were negligible to all water column biota, including the most sensitive species. Thus, as a general conclusion, the tradeoff with respect to wildlife versus water column would be in favor of dispersant use for oil volumes < 1,000 gal. Dispersing more than 1,000 gal of oil in a single location during a short period of time (<1 hour) could have impacts on biota in the surface mixed layer, depending on winds, degree of current shear, weathering state, temperature, and sensitivity of the aquatic biota exposed (i.e., toxicity). However, the volume and area of surface water affected would be much less than the area of water surface swept by that same oil. Furthermore, the model results showed that dispersant application on spills of < 50,000 gal (189 m³) produced non-measurable impacts on water column organisms of *average* sensitivity to dissolved PAHs, regardless of dispersant effectiveness assumed or environmental conditions (i.e., volumes impacted by < 25,000 gal of entrained oil were not measurable for species of average sensitivity).

This field guide is designed to present the biological impact tradeoffs encountered when applying chemical dispersant to an oil spill in open water. Each chart in this guide presents the tradeoffs for dispersing 0%, 20%, or 50% of a spill in 12 or 24 hours following the incident.

There is a chart for each oil type (2), spill volume (2), wind condition (2), and water temperature (3). The spill conditions for each chart of tradeoffs can be found in the blue box and general trends for each chart can be found in the green box.





Oil Type:

Light Crude

Spill Size:

100,000 gallons

Wind Conditions:

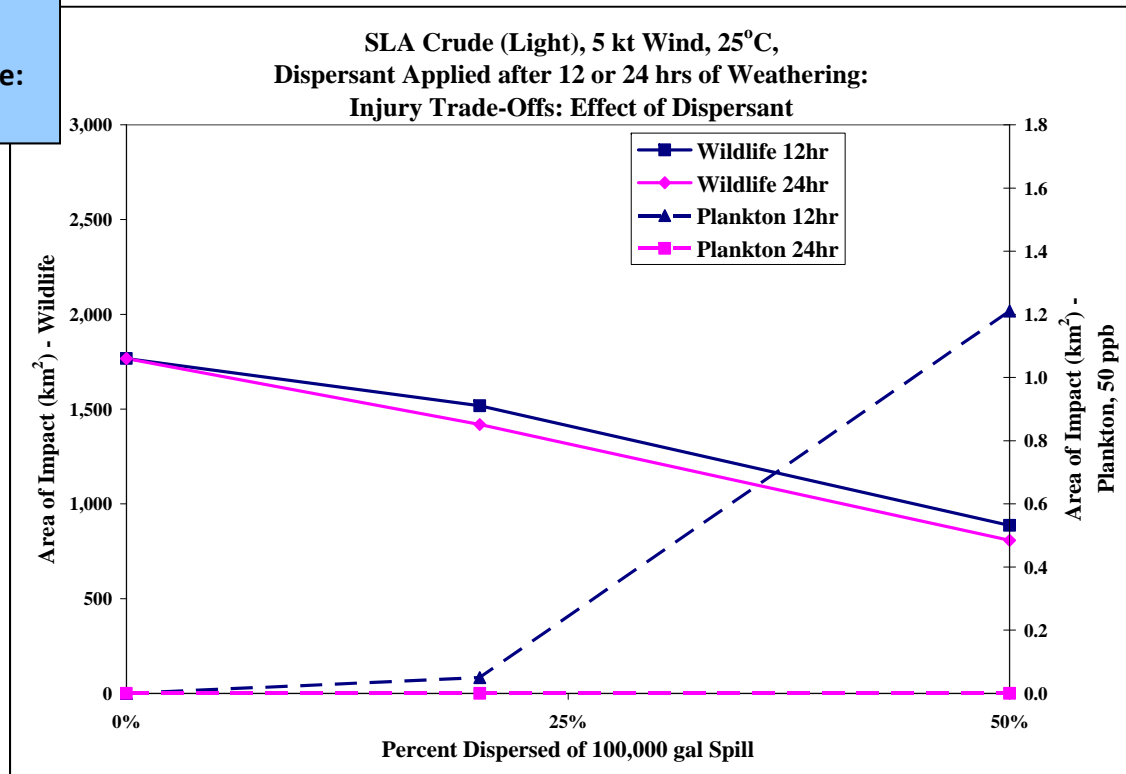
0-12 knots

Water Temperature:

20-30 C

Tradeoffs:

- Large increase in water column impacts at 50% dispersal;
- Moderate decrease in wildlife impacts with increased dispersal percentage.





Oil Type:

Light Crude

Spill Size:

100,000 gallons

Wind Conditions:

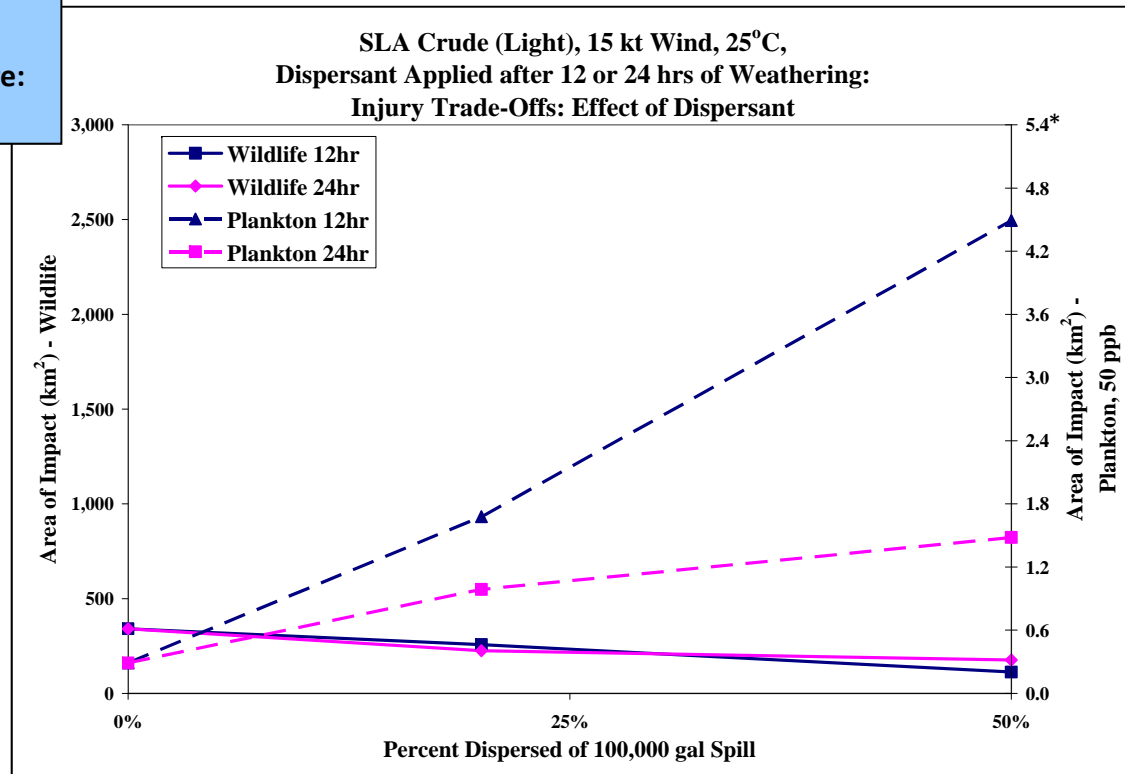
12-25 knots

Water Temperature:

20-30 C

Tradeoffs:

- Large increase in water column impacts with increased dispersal;
- Small decrease in wildlife impacts.



*Note change in scale



Oil Type:

Light Crude

Spill Size:

100,000 gallons

Wind Conditions:

0-12 knots

Water Temperature:

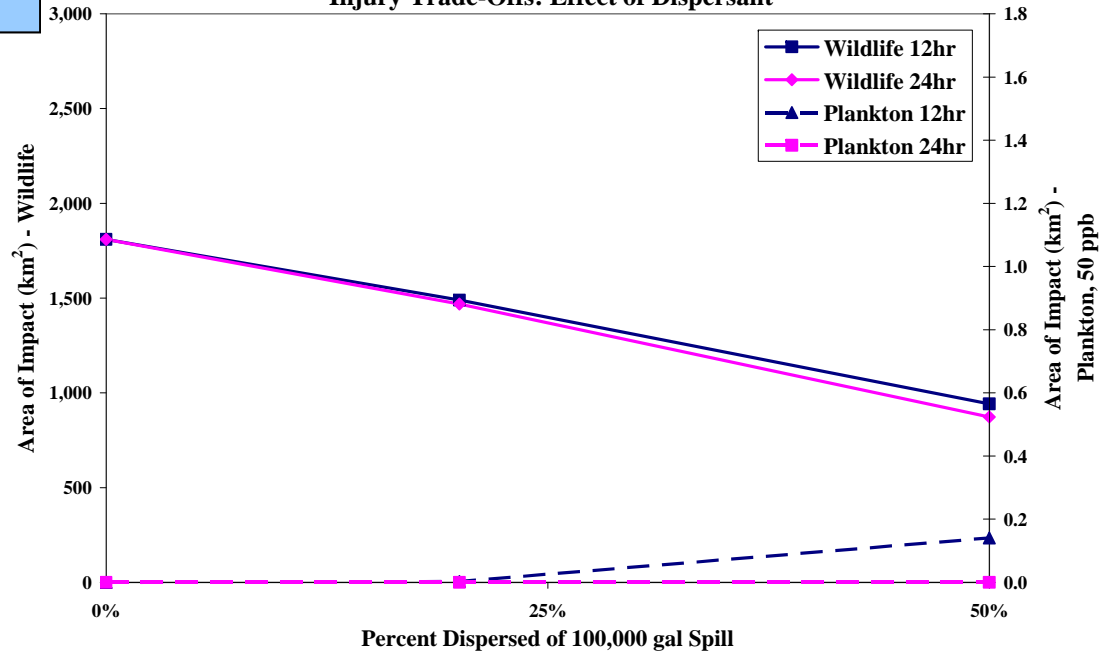
10-20 C

Tradeoffs:

- Small increase in water column impacts at 50% dispersal;
- Moderate decrease in wildlife impacts with increased dispersal percentage.



SLA Crude (Light), 5 kt Wind, 15°C,
Dispersant Applied after 12 or 24 hrs of Weathering:
Injury Trade-Offs: Effect of Dispersant





Oil Type:

Light Crude

Spill Size:

100,000 gallons

Wind Conditions:

12-25 knots

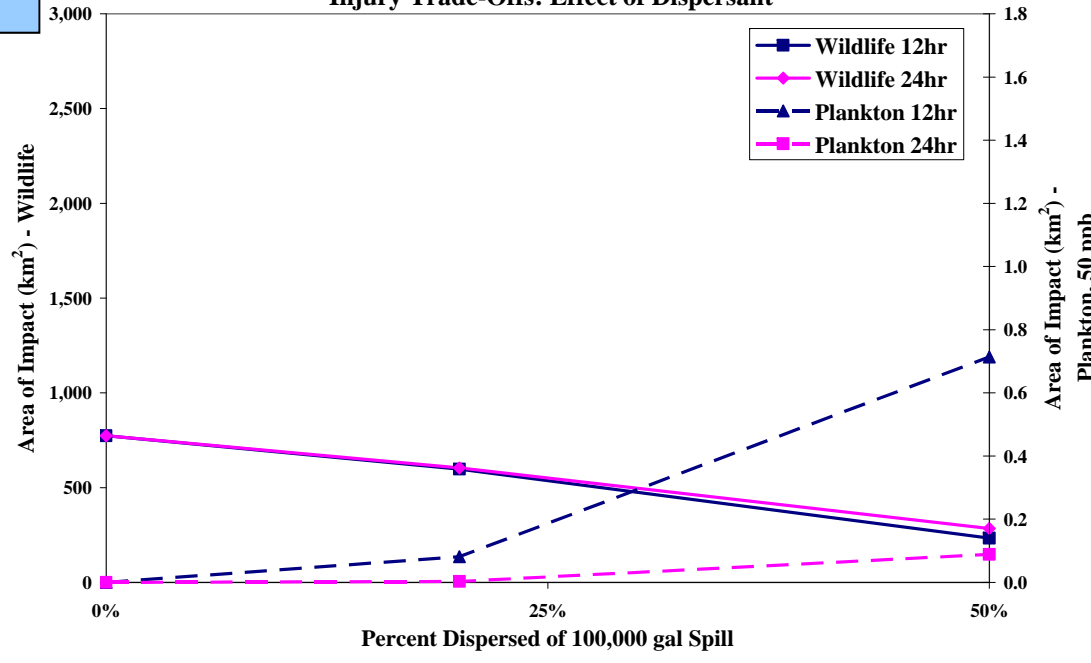
Water Temperature:

10-20 C

Tradeoffs:

- Moderate increase in water column impacts with increased dispersal;
- Moderate decrease in wildlife impacts with increased dispersal.

SLA Crude (Light), 15 kt Wind, 15°C,
 Dispersant Applied after 12 or 24 hrs of Weathering:
 Injury Trade-Offs: Effect of Dispersant





Oil Type:

Light Crude

Spill Size:

100,000 gallons

Wind Conditions:

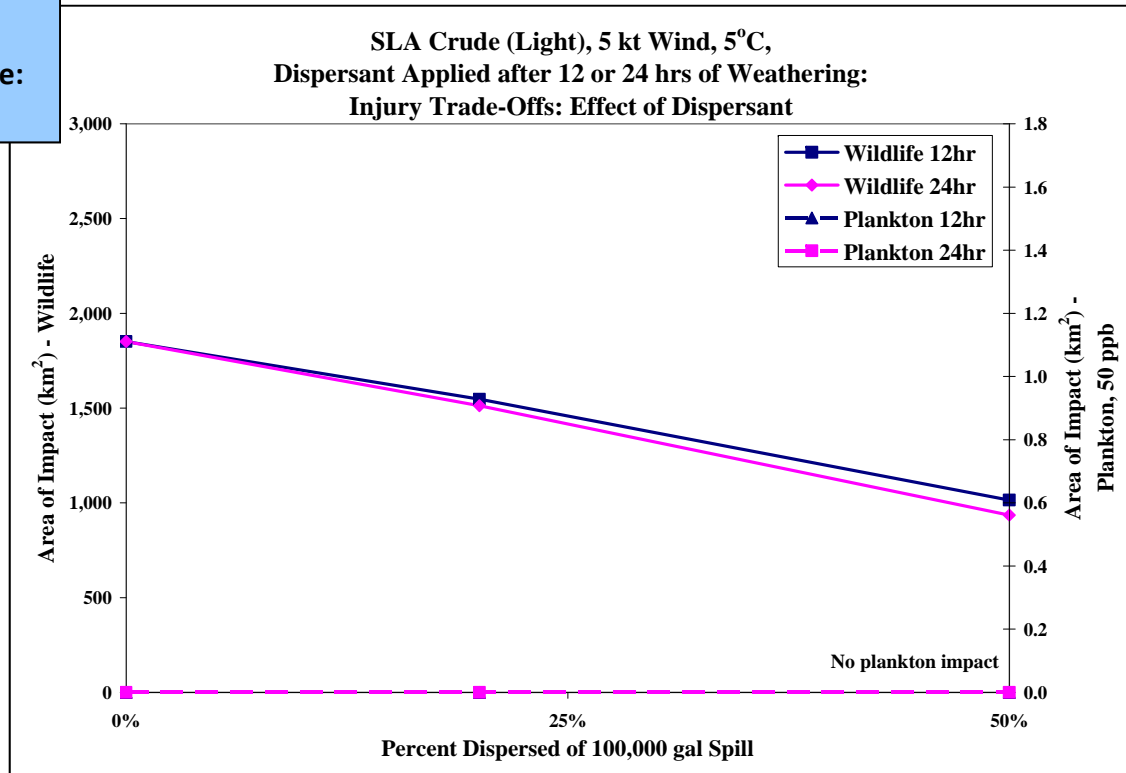
0-12 knots

Water Temperature:

0-10 C

Tradeoffs:

- Non-measurable impact to water column;
- Moderate decrease in wildlife impacts with increased dispersal percentage.





Oil Type:
Light Crude

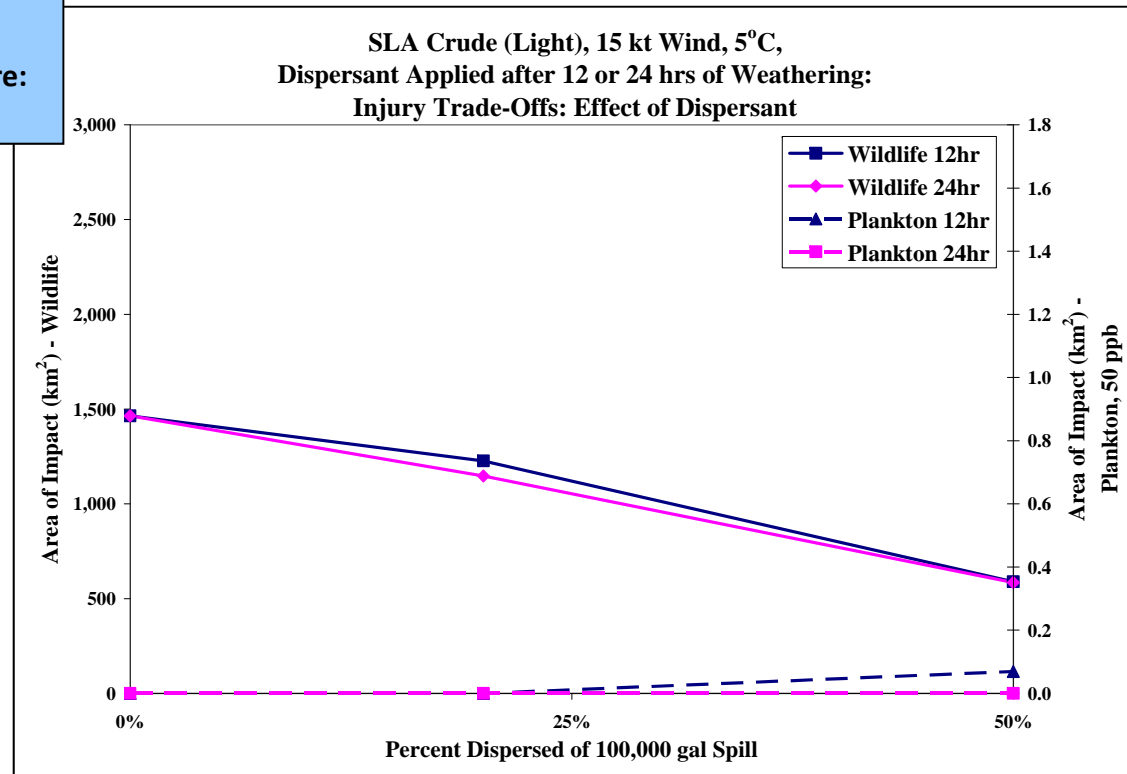
Spill Size:
100,000 gallons

Wind Conditions:
12-25 knots

Water Temperature:
0-10 C

Tradeoffs:

- Slight increase in water column impacts with 50% dispersal;
- Moderate decrease in wildlife impacts with increased dispersal.





Oil Type:

Light Crude

Spill Size:

50,000 gallons

Wind Conditions:

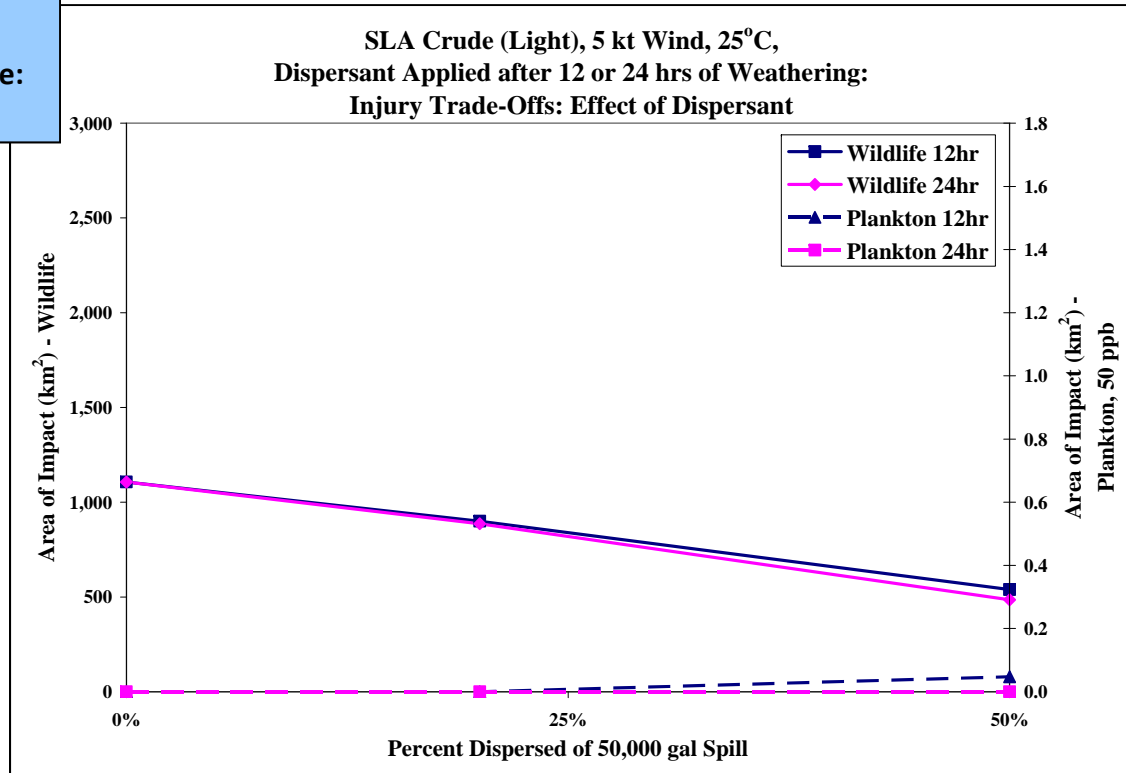
0-12 knots

Water Temperature:

20-30 C

Tradeoffs:

- Slight increase in water column impacts at 50% dispersal;
- Small decrease in wildlife impacts with increased dispersal percentage.





Oil Type:

Light Crude

Spill Size:

50,000 gallons

Wind Conditions:

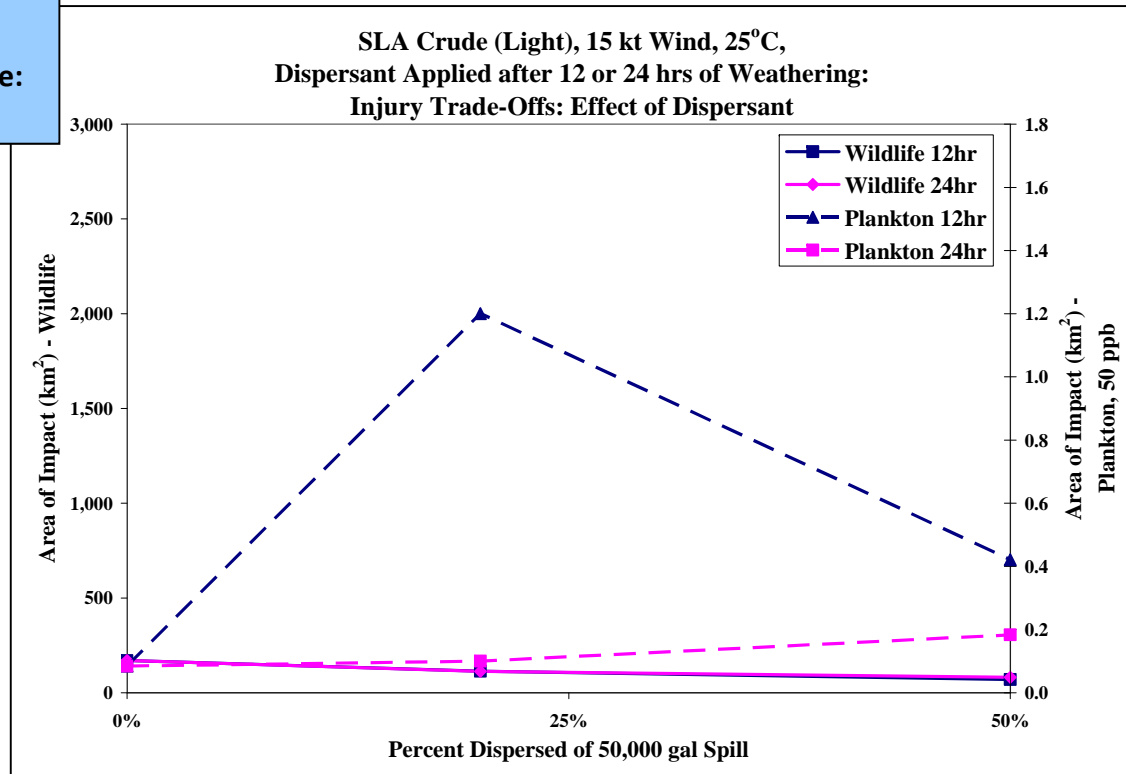
12-25 knots

Water Temperature:

20-30 C

Tradeoffs:

- Large increase in water column impacts at 20% dispersal;
- Slight decrease in wildlife impacts.



*Note peak in Plankton 12hr due to variability in the model



Oil Type:

Light Crude

Spill Size:

50,000 gallons

Wind Conditions:

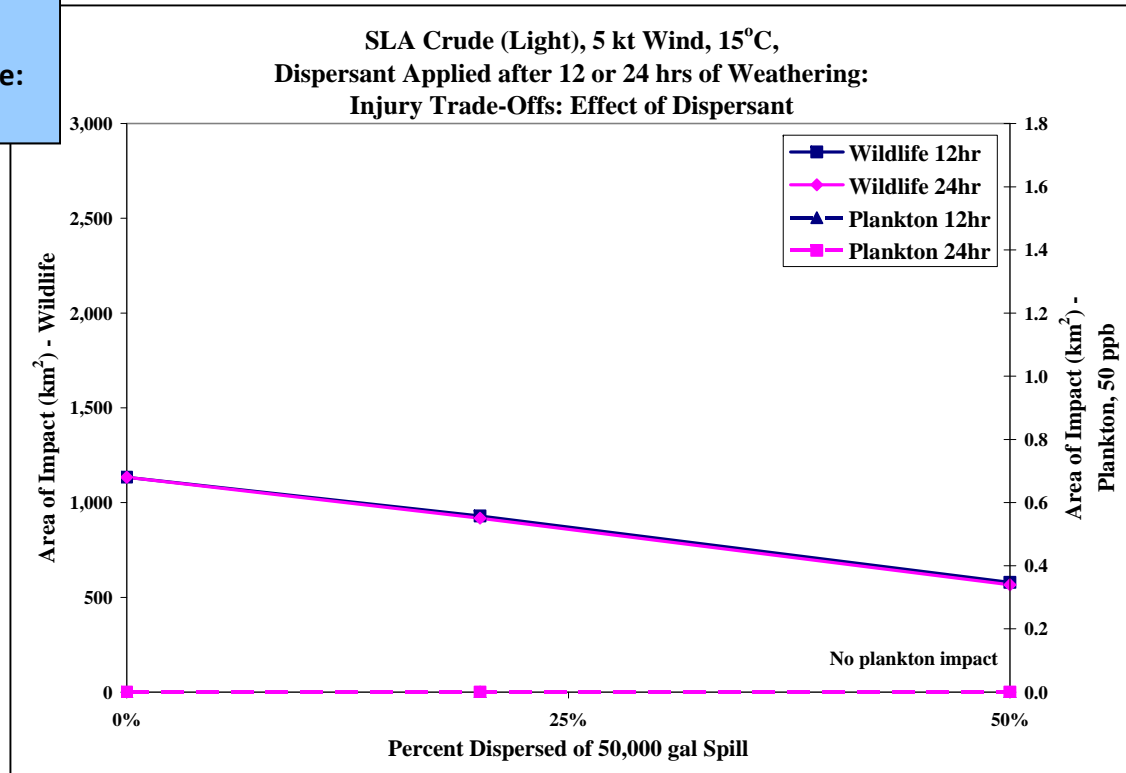
0-12 knots

Water Temperature:

10-20 C

Tradeoffs:

- Non-measurable impact to water column;
- Moderate decrease in wildlife impacts with increased dispersal percentage.





Oil Type:

Light Crude

Spill Size:

50,000 gallons

Wind Conditions:

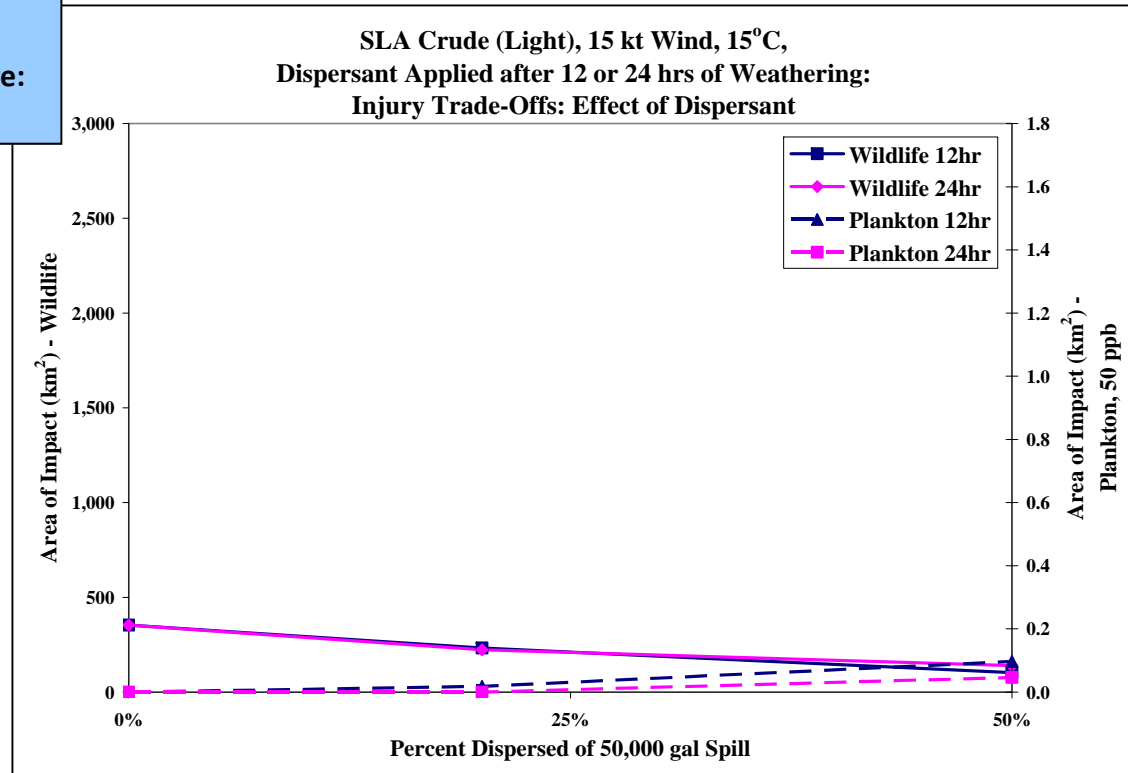
12-25 knots

Water Temperature:

10-20 C

Tradeoffs:

- Small increase in water column impacts with increased dispersal;
- Small decrease in wildlife impacts with increased dispersal.





Oil Type:

Light Crude

Spill Size:

50,000 gallons

Wind Conditions:

0-12 knots

Water Temperature:

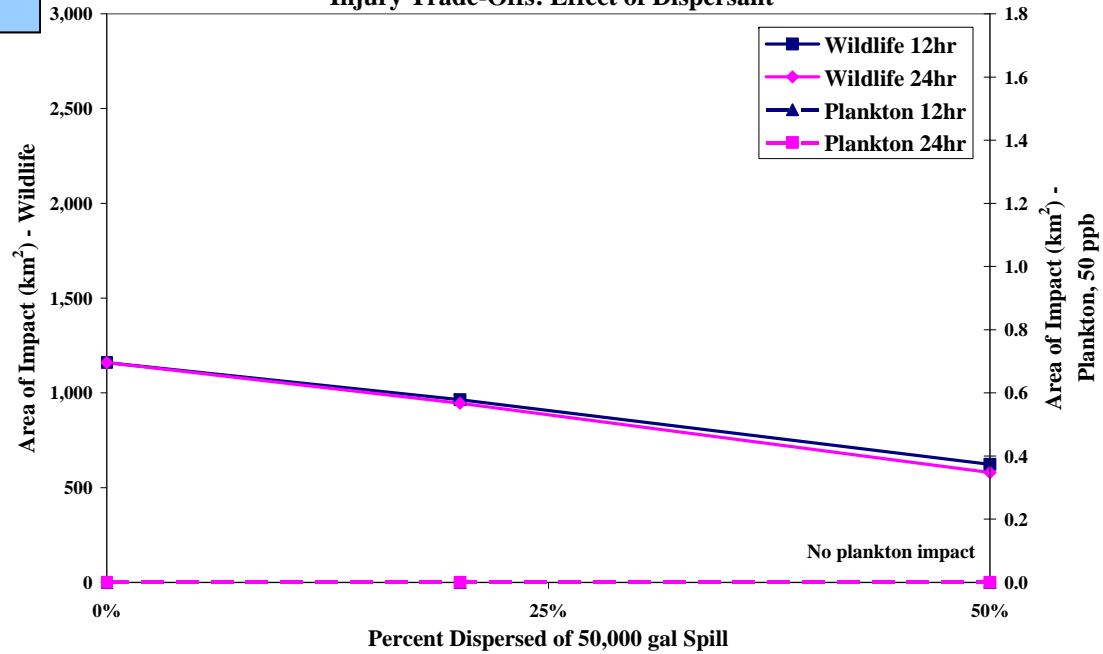
0-10 C

Tradeoffs:

- Non-measurable impact to water column;
- Moderate decrease in wildlife impacts with increased dispersal percentage.



SLA Crude (Light), 5 kt Wind, 5°C,
Dispersant Applied after 12 or 24 hrs of Weathering:
Injury Trade-Offs: Effect of Dispersant





Oil Type:
Light Crude

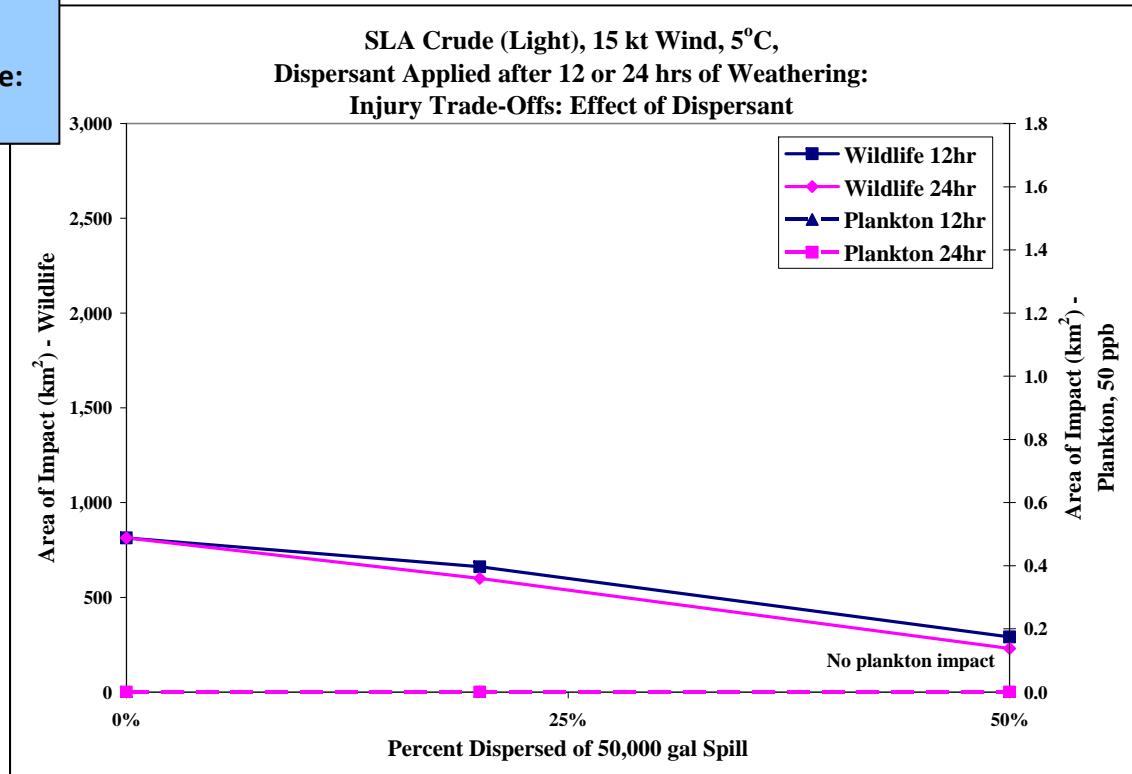
Spill Size:
50,000 gallons

Wind Conditions:
12-25 knots

Water Temperature:
0-10 C

Tradeoffs:

- Non-measurable impact to water column;
- Moderate decrease in wildlife impacts with increased dispersal.

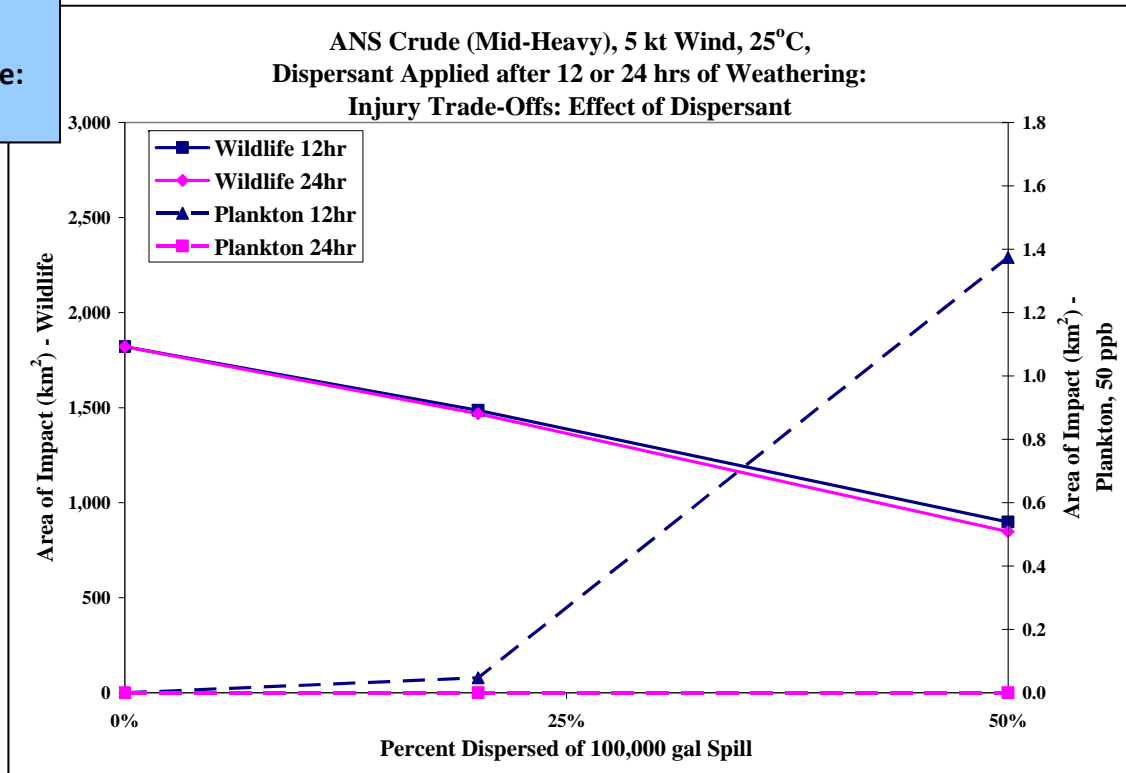




Oil Type:
Mid/Heavy Crude
Spill Size:
100,000 gallons
Wind Conditions:
0-12 knots
Water Temperature:
20-30 C

Tradeoffs:

- Large increase in water column impacts at 50% dispersal;
- Moderate decrease in wildlife impacts with increased dispersal percentage.





Oil Type:
Mid/Heavy Crude

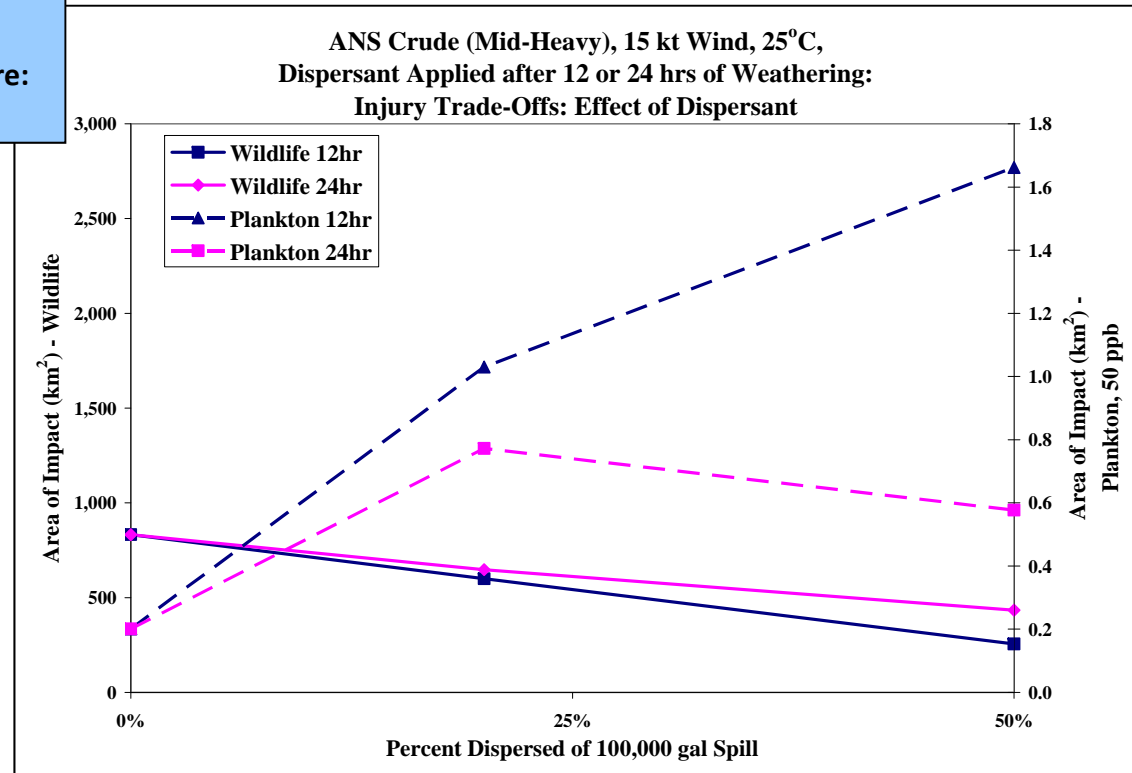
Spill Size:
100,000 gallons

Wind Conditions:
12-25 knots

Water Temperature:
20-30 C

Tradeoffs:

- Large increase in water column impacts with increased dispersal;
- Small decrease in wildlife impacts with increased dispersal percentage.



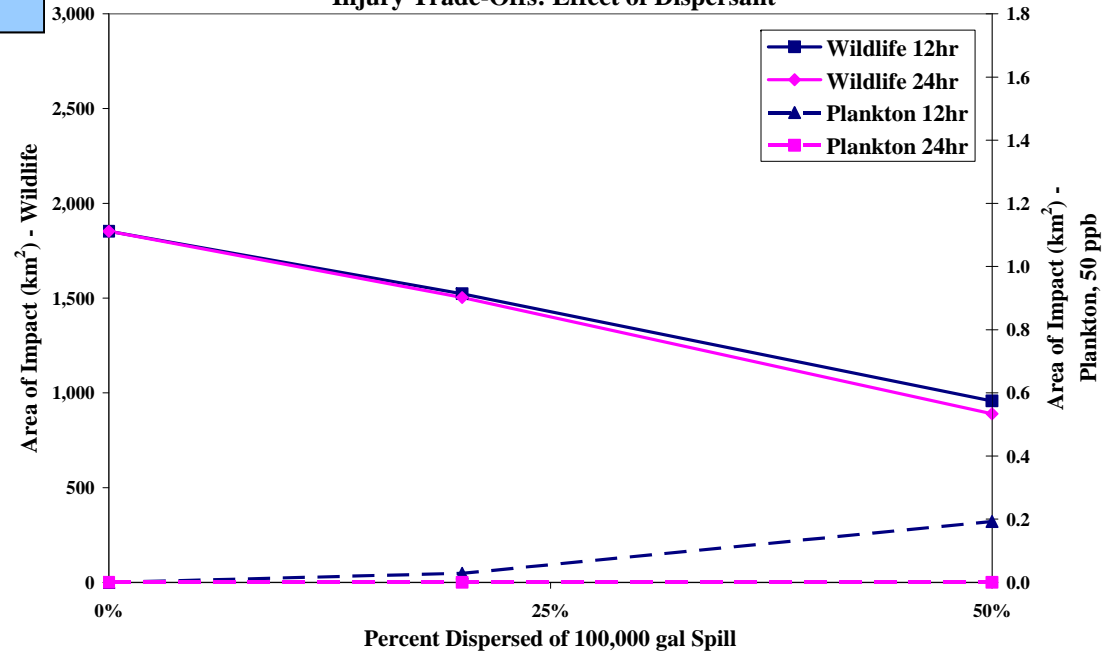


Oil Type:
Mid/Heavy Crude
Spill Size:
100,000 gallons
Wind Conditions:
0-12 knots
Water Temperature:
10-20 C

Tradeoffs:

- Small increase in water column impacts with increased dispersal;
- Moderate decrease in wildlife impacts with increased dispersal percentage.

ANS Crude (Mid-Heavy), 5 kt Wind, 15°C,
Dispersant Applied after 12 or 24 hrs of Weathering:
Injury Trade-Offs: Effect of Dispersant





Oil Type:
Mid/Heavy Crude

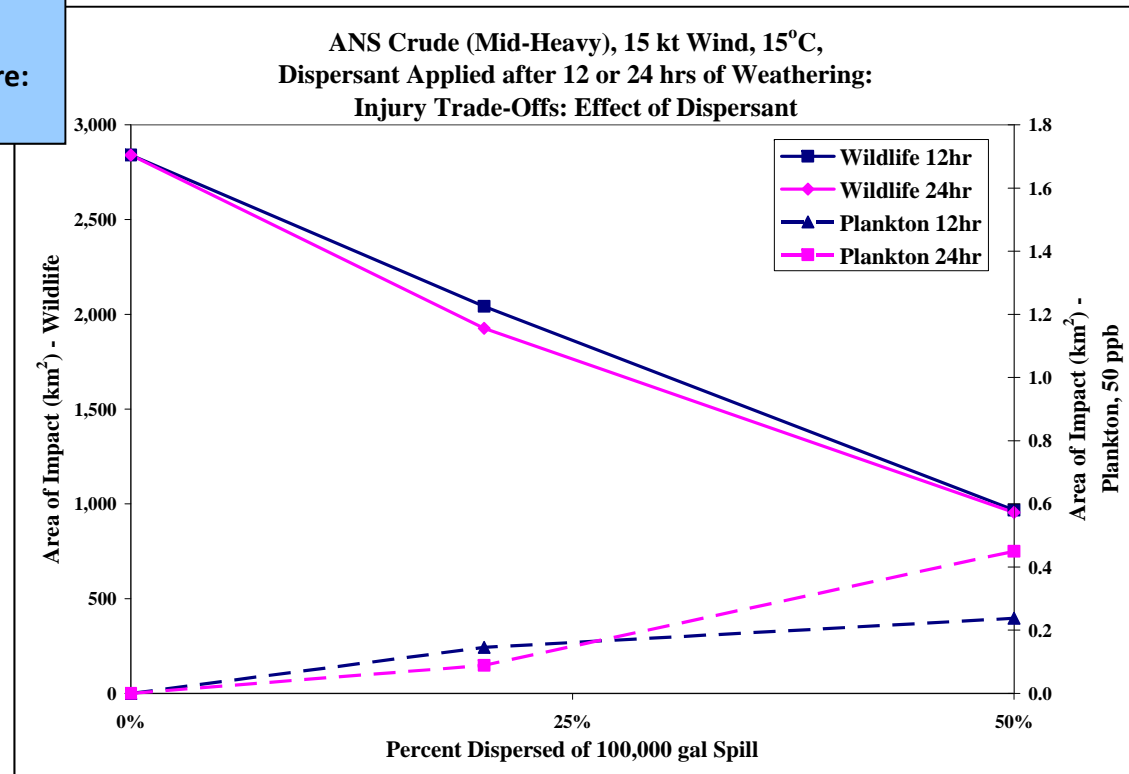
Spill Size:
100,000 gallons

Wind Conditions:
12-25 knots

Water Temperature:
10-20 C

Tradeoffs:

- Moderate increase in water column impacts with increased dispersal;
- Large decrease in wildlife impacts with increased dispersal.





Oil Type:

Mid/Heavy Crude

Spill Size:

100,000 gallons

Wind Conditions:

0-12 knots

Water Temperature:

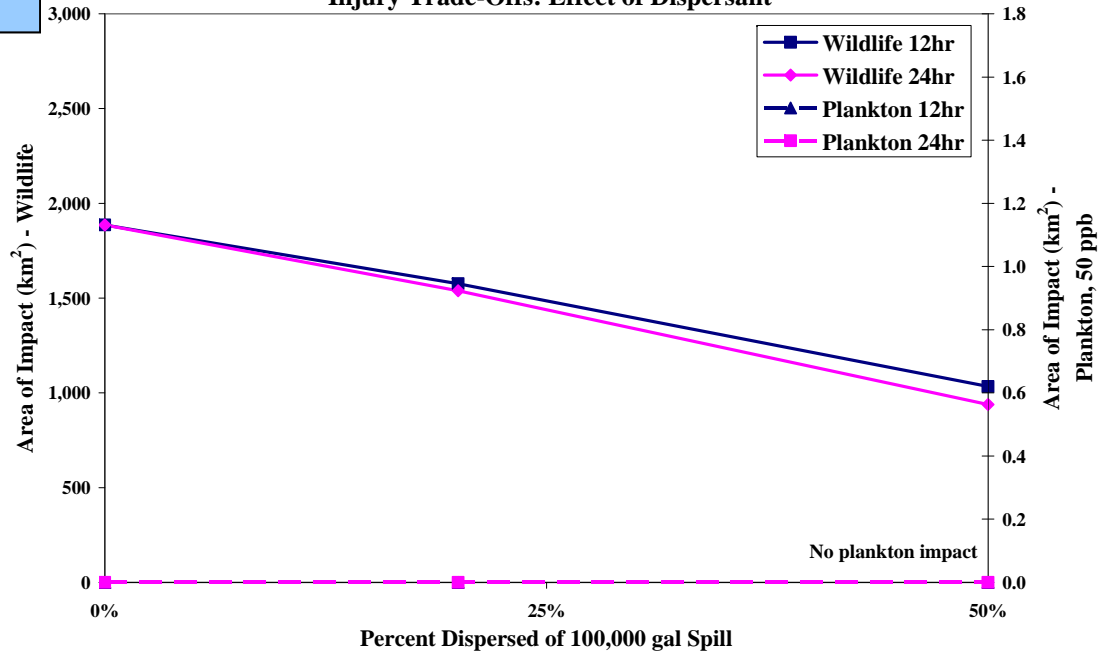
0-10 C

Tradeoffs:

- Non-measurable impact to water column;
- Moderate decrease in wildlife impacts with increased dispersal percentage.



ANS Crude (Mid-Heavy), 5 kt Wind, 5°C,
Dispersant Applied after 12 or 24 hrs of Weathering:
Injury Trade-Offs: Effect of Dispersant





Oil Type:
Mid/Heavy Crude

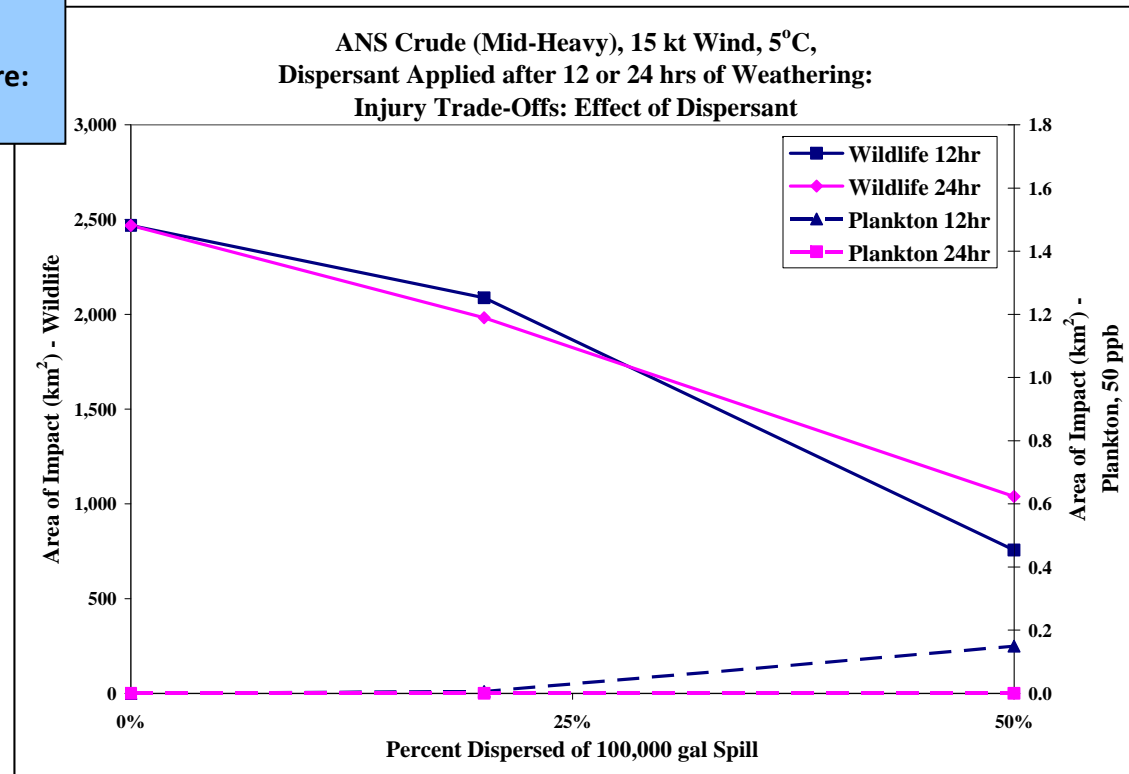
Spill Size:
100,000 gallons

Wind Conditions:
12-25 knots

Water Temperature:
0-10 C

Tradeoffs:

- Small increase in water column impacts at 50% dispersal;
- Large decrease in wildlife impacts with increased dispersal.





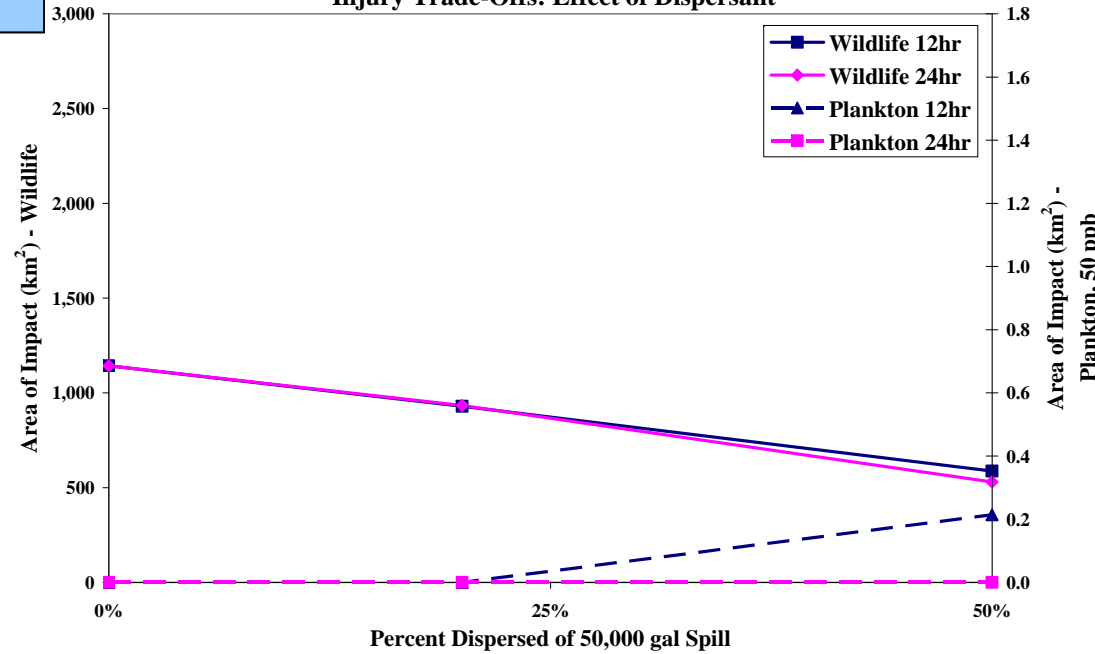
Oil Type:
Mid/Heavy Crude
Spill Size:
50,000 gallons
Wind Conditions:
0-12 knots
Water Temperature:
20-30 C

Tradeoffs:

- Small increase in water column impacts at 50% dispersal;
- Small decrease in wildlife impacts with increased dispersal percentage.



ANS Crude (Mid-Heavy), 5 kt Wind, 25°C,
Dispersant Applied after 12 or 24 hrs of Weathering:
Injury Trade-Offs: Effect of Dispersant





Oil Type:
Mid/Heavy Crude

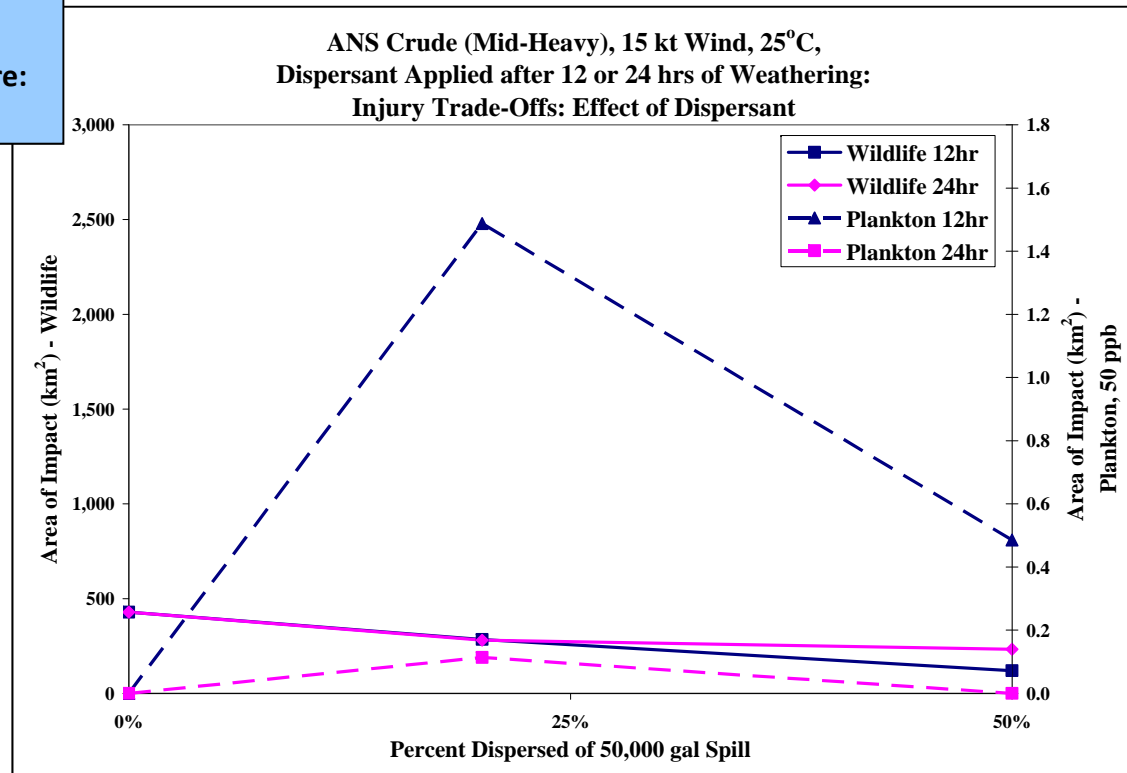
Spill Size:
50,000 gallons

Wind Conditions:
12-25 knots

Water Temperature:
20-30 C

Tradeoffs:

- Large increase in water column impacts at 20% dispersal;
- Slight decrease in wildlife impacts.



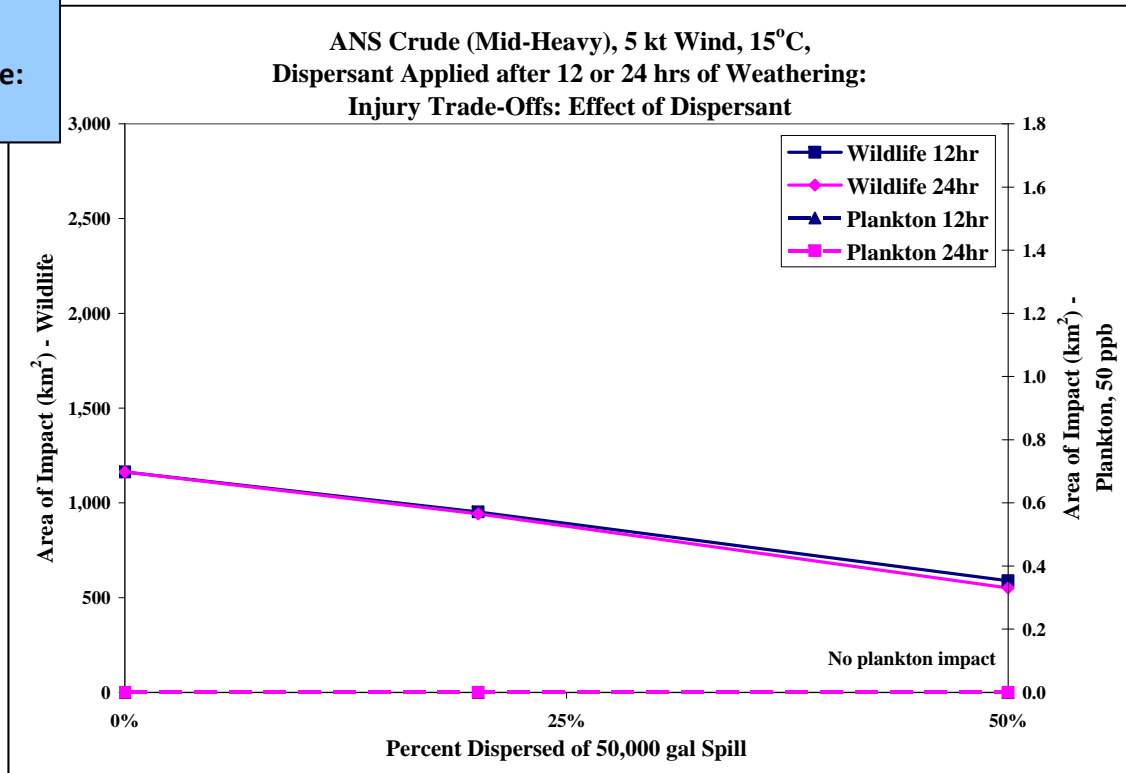
*Note peaks in Plankton due to variability in the model



Oil Type:
Mid/Heavy Crude
Spill Size:
50,000 gallons
Wind Conditions:
0-12 knots
Water Temperature:
10-20 C

Tradeoffs:

- Non-measurable impact to water column;
- Moderate decrease in wildlife impacts with increased dispersal percentage.





Oil Type:
Mid/Heavy Crude

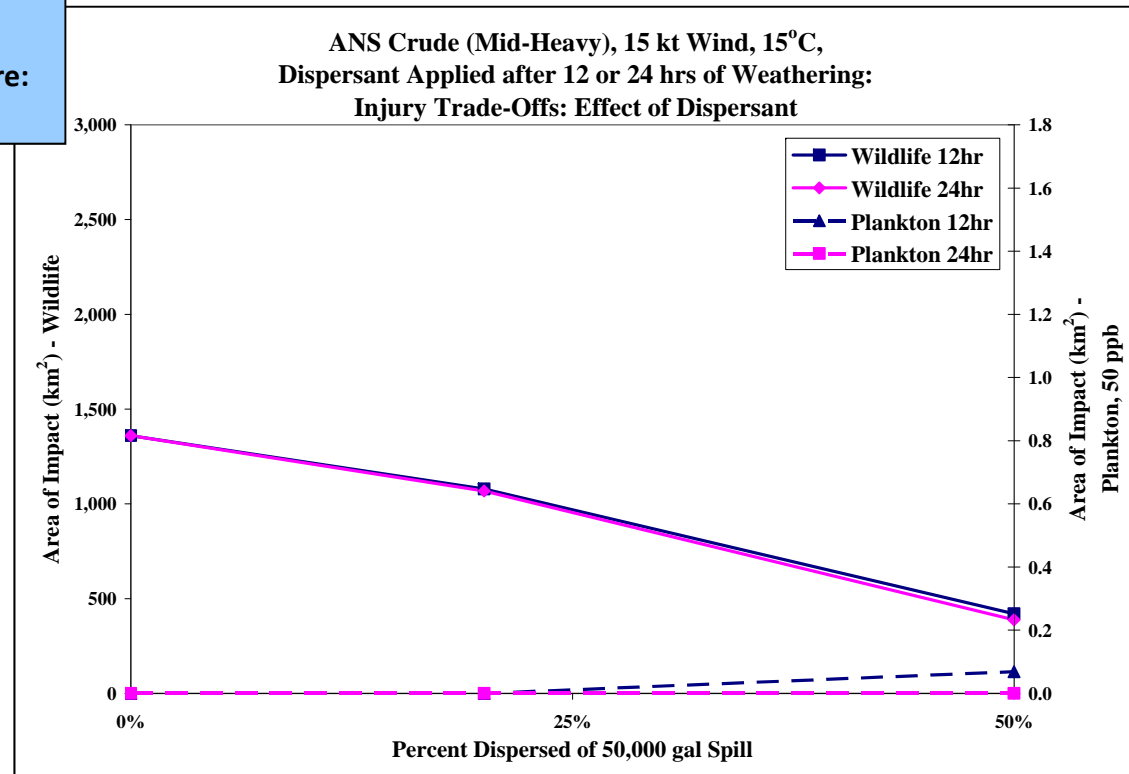
Spill Size:
50,000 gallons

Wind Conditions:
12-25 knots

Water Temperature:
10-20 C

Tradeoffs:

- Slight increase in water column impacts with increased dispersal;
- Large decrease in wildlife impacts with increased dispersal.





Oil Type:

Mid/Heavy Crude

Spill Size:

50,000 gallons

Wind Conditions:

0-12 knots

Water Temperature:

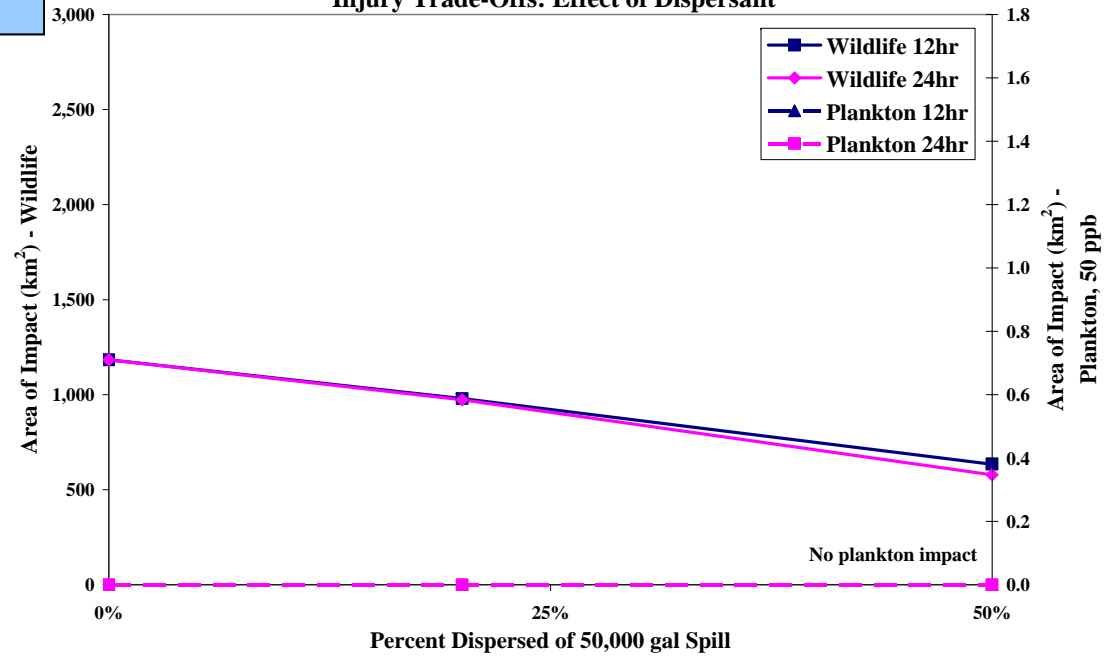
0-10 C

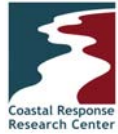
Tradeoffs:

- Non-measurable impact to water column;
- Small decrease in wildlife impacts with increased dispersal percentage.



ANS Crude (Mid-Heavy), 5 kt Wind, 5°C,
Dispersant Applied after 12 or 24 hrs of Weathering:
Injury Trade-Offs: Effect of Dispersant





Oil Type:
Mid/Heavy Crude

Spill Size:
50,000 gallons

Wind Conditions:
12-25 knots

Water Temperature:
0-10 C

Tradeoffs:

- Slight increase in water column impacts with increased dispersal;
- Moderate decrease in wildlife impacts with increased dispersal.

