The background is a light blue gradient with several realistic water droplets and bubbles of various sizes scattered across the surface. The droplets have highlights and shadows, giving them a three-dimensional appearance.

Ballast/Wake Boats: Specific Concerns About Aquatic Invasive Species & Water Quality

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Ballast Water And Aquatic Invasive Species (AIS)

Key concerns with these vessels – clean, drain & dry efforts are not always enough....

- Ballast bags/tanks can transport water/species
- Operation can lead to fragmentation of nearshore beds of invasive aquatic plants from large and repetitive waves



HELP STOP THE SPREAD OF AQUATIC INVASIVE SPECIES



In New Hampshire, you are never more than a short drive away from a lake, pond or river where you can launch your motorboat, sailboat, canoe, kayak or paddleboard into the water.

By always making sure that your boat, trailer and gear are cleaned, drained and dry before launching into the water, you will prevent the spread of aquatic invasive species, and will help keep our waters bostable, enjoyable and healthy.

If you have questions or if you believe you found a new infestation of aquatic invasive species, contact the New Hampshire Department of Environmental Services Exotic Species Program at (603) 271-2248.

Updated maps and details of infestations can be found online at:
<http://nhdes.maps.arcgis.com> > "NHDES Lake Mapper."



Fat Sacs & Ballast Bags



Eight.3 Plug 'N Play Ballast Bag
Black/Juice 400Lb
Size: 400lbs
Our Price: **\$159.99**



Eight.3 Plug 'N Play Ballast Bag
Black/Juice 800Lb
Size: 800lbs
Our Price: **\$169.99**



Eight.3 Plug 'N Play Ballast Bag
Silver/Scuderia 800Lb
Size: 800lbs
Our Price: **\$169.99**



Eight.3 Plug 'N Play Ballast Bag
Silver/Scuderia 400Lb
Size: 400lbs
Our Price: **\$159.99**



Fly High Mastercraft X-Star Bow
Walkthru Fat Sac Fit Not Incl 450
Lbs
Size: 450lbs
Our Price: **\$209.95**



Fly High Pro X Series Side Sac Pair
48X12X12 260Lbs
Size: 48x12x12
Our Price: **\$189.99**



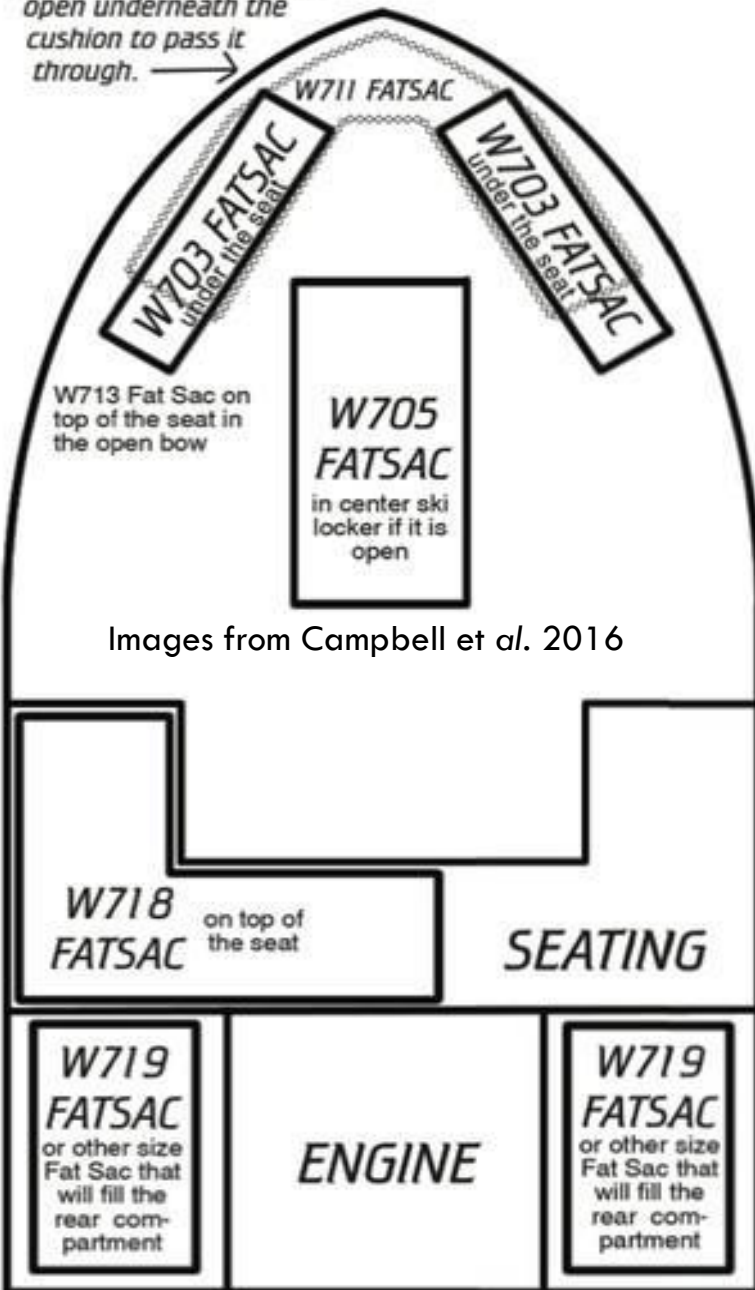
Fly High Pro X Series Ultimate
Wake Surf Sac 20x20x60 1150Lbs
Size: 24x16x60
Our Price: **\$369.99**



Freemotion Single Ballast Bag
540lbs
Size: 540lbs
Reg: \$99.95 **15% Off**
On Sale: **\$84.95**



W711 Fatsac can be used if the nose of the boat is open underneath the cushion to pass it through.



Images from Campbell et al. 2016

Ballast Tanks/Bags/Sacs

- Volume of bags and tanks ranges from 80-600 liters, to add hundreds of pounds of weight to the vessel
 - These take water directly from the lake/river they are on to make the boat heavier, to sit in the water deeper, to make bigger waves/wakes
- A drop (about a milliliter) of water can contain hundreds of microscopic organisms and larvae
 - 80-600 liters could hold thousands!
- These bags and sacs are not fully drained between waterbodies or portions of waterbodies, allowing for spread of AIS

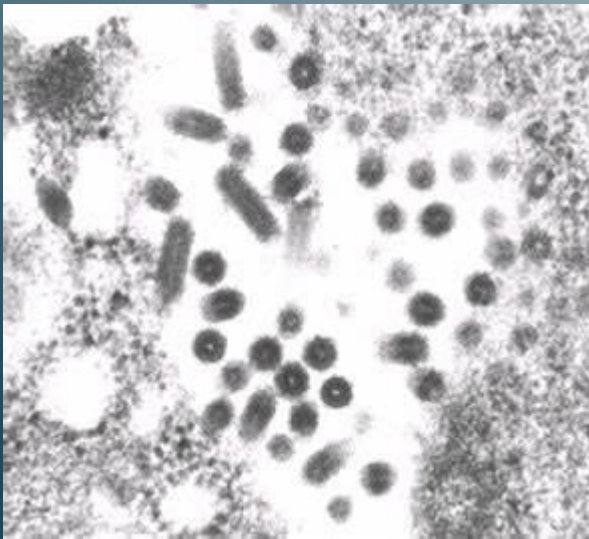


Asian clam



Zebra or Quagga mussels

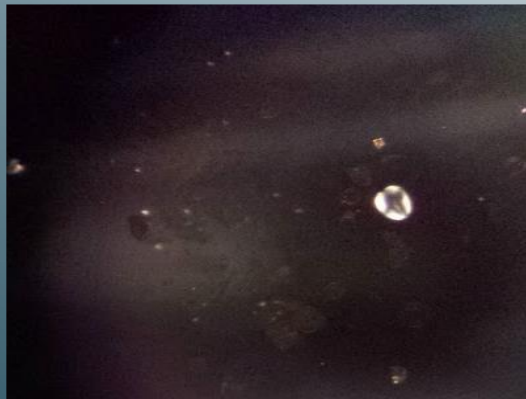
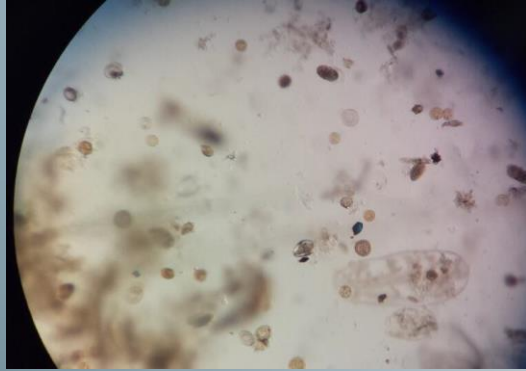
Pathogens (bacteria, viruses, parasites)



**Invasive zooplankton
spiny or fishhook
water flea**



Sea Grant Study Of Ballast Bags



Images of microscopic organisms found in samples from ballast bags in SeaGrant study

Top: Array of plankton in a sample

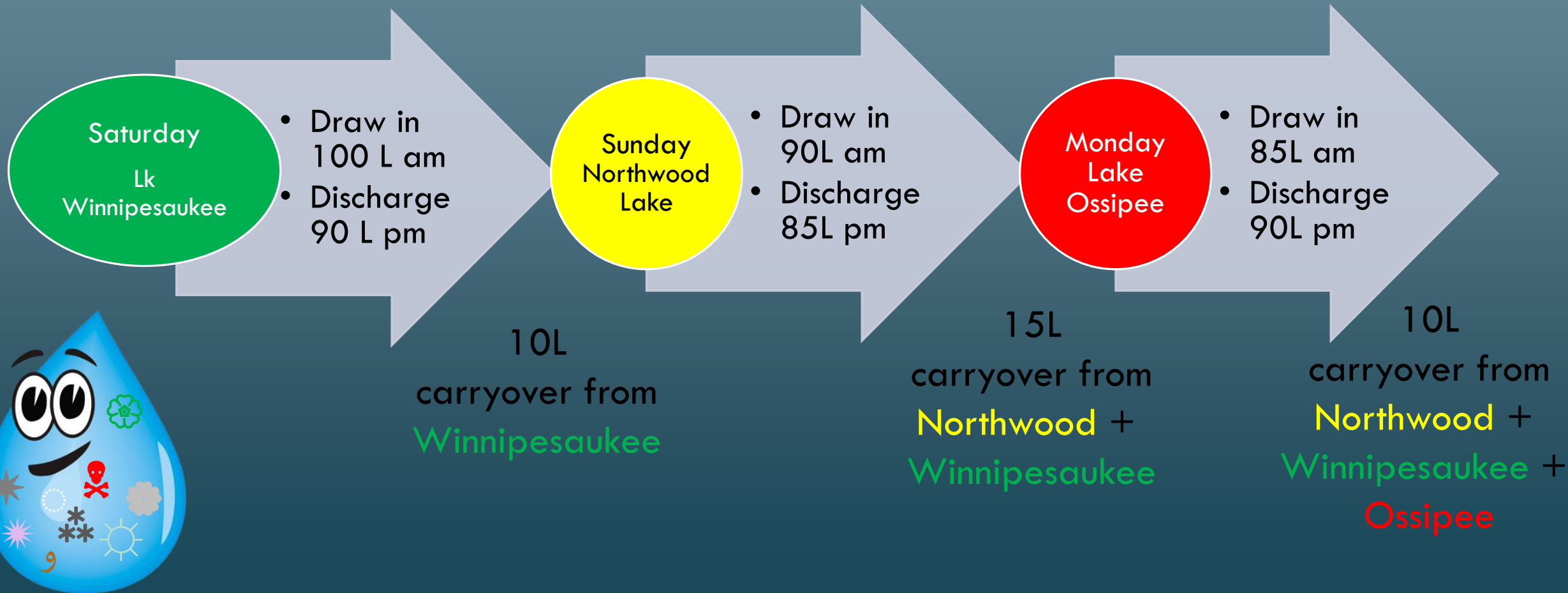
Bottom: Zebra mussel veliger

- 13 ballast bags sampled
- Residual water volume in ballast tanks ranged from 1-86.8 liters/bag
 - Average of 31.7L
- Live organisms found in 9 out of 13 bags, two of which included zebra mussel larvae
- Organisms had been alive in the bags for at least 7 days by the time they were sampled

Data from Campbell et al. 2016

Bits Of Ballast Can Move From Lake To Lake...

Possible Scenario Of A Boater Over A Long Weekend



The background is a light blue gradient with several realistic water droplets of various sizes scattered in the corners. The droplets have highlights and shadows, giving them a three-dimensional appearance.

Big Wakes and Water Quality

What's the Big Deal?

Boat Engines: Horsepower Impacts

Horsepower	Depth Impacted
10	6 feet
28	10 feet
50	15 feet

Data from Nedohin and Elefsiniotis, 1997

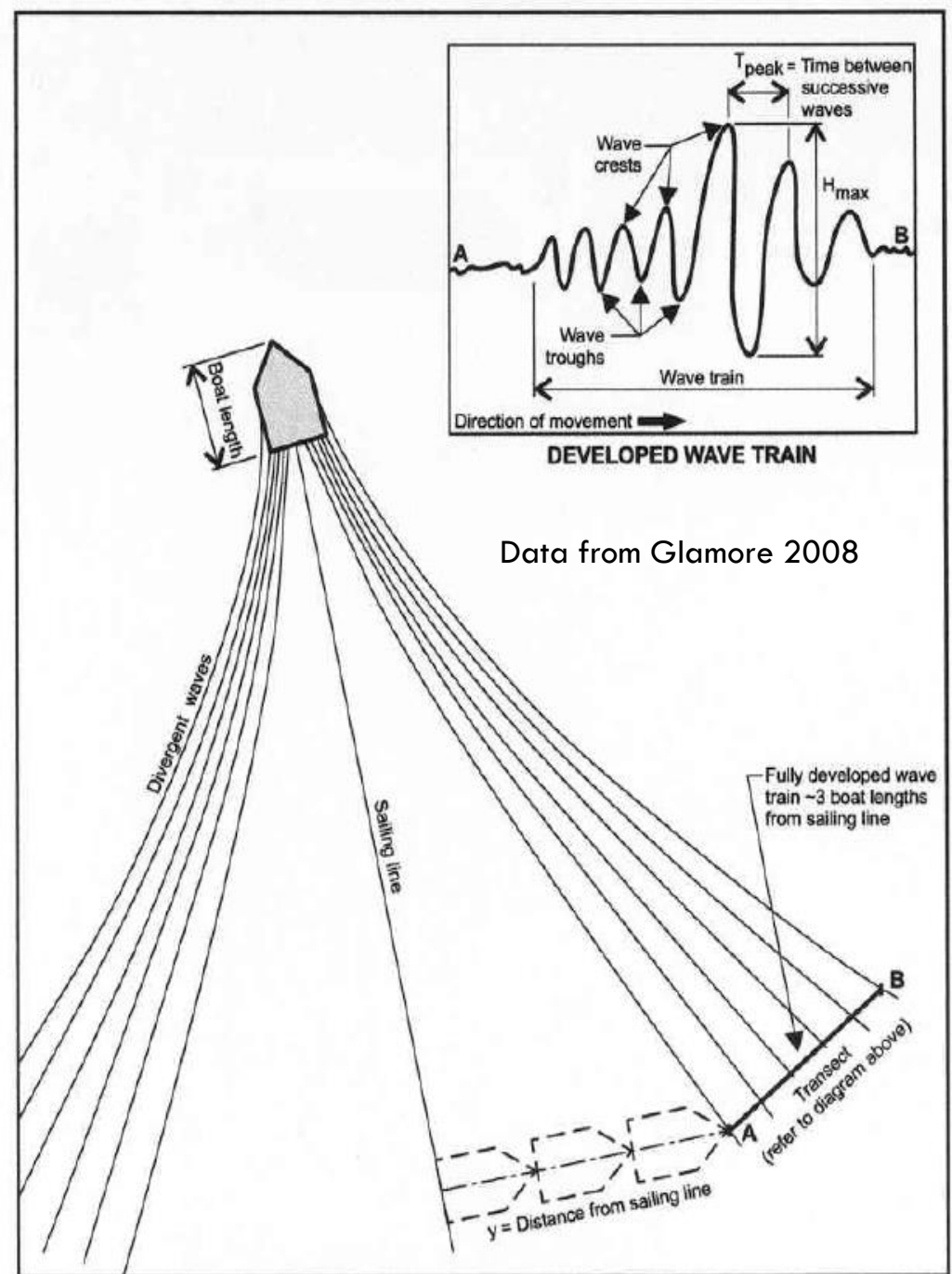


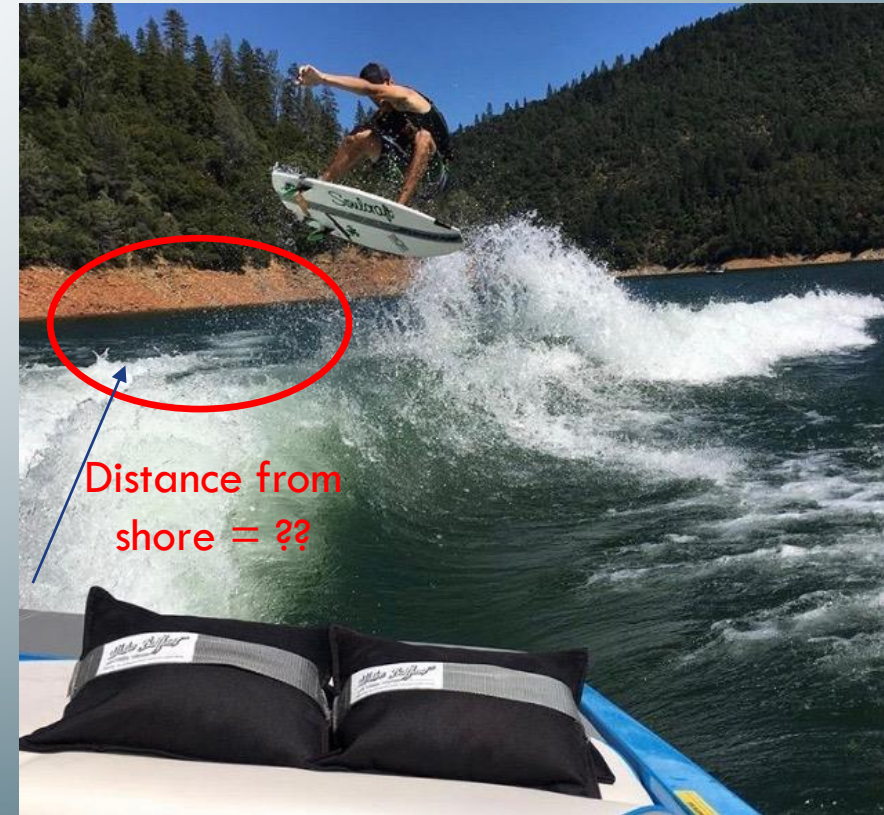
Figure 1. Schematic of Boat Wake Waves

Wave Energy

- The maximum wave energy is much higher for wakeboard boats than waterski boats
- Max energy for both boat types is higher at low speeds.
 - Wake/ballast boat has
 - 4.7x more energy than a waterski boat and at slow speed
 - 2.4x more energy than at operating speed.

Direct Water Quality Concerns

- Shoreline erosion as a result of boat wakes
- Turbidity/reduced clarity from erosion and suspended sediment
- Nutrient loading from erosion and suspended sediment
 - Fine particles can stay suspended for 24 hours or more
- Disruption/damage to aquatic plant beds from direct boat contact and wave damage



From Wakeballast.com

Cascading Effects



- Suspended sediment can have a high nutrient load
- Nutrients in the water column can fuel algal blooms, including harmful cyanobacteria blooms
- Suspended sediment can disrupt feeding of microscopic organisms, affecting the food web
- Suspended sediment can impact fish gills and ultimately the health of the fishery
- Changes in all of these categories could accelerate eutrophication of our lakes (aka, “lake aging”)

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