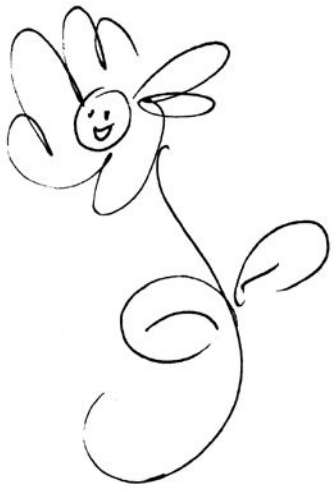
PLASTIC FISHES

Wolfgang Trettnak



PLASTIC FISHES

Wolfgang Trettnak

2011 - 2014

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THE AUTHOR

WOLFGANG TRETTNAK was born in Graz (Austria) and received a PhD in Chemistry from the University of Graz. He worked in applied research on sensors and biosensors for many years and published a number of scientific articles. In 2002 he became a free-lance artist, and his work, which comprises painting, object art and installations, has been exhibited in Europe, America and China. The artist links science with art on subjects such as bionics, electronics, luminescence and environmental topics.

After the exhibition “ELECTRONIC FISHES”, which was dealing with electric fishes, bioluminescent marine organisms and fish robots, “PLASTIC FISHES” is his second exhibition, which was created in Galicia and which is dedicated to marine life and environment and tries to combine art and science.

“PLASTIC FISHES” was realized in the years from 2011 to 2014 and comprises some art works, which were created in collaboration with the Galician artist Margarita Cimadevila (www.cimadevila.tk). It has found its continuation in the exhibition “MARE PLASTICUM”, where almost all of the works are of joint authorship, both in planning and realisation. Both artists are members of the association ARSCIENCIA (www.arsciencia.org), which is dedicated to the world of science and art and is consisting of an international and multidisciplinary team.

PLASTIC FISHES

There are several major threats to the oceans and all the marine organisms living therein. All of them are of human origin. Among them are, for example:

- **Overfishing and overexploitation**
- **The pollution of the oceans**
- **The global climate change**
- **Alien species invading new ecosystems**

A particular and very serious form of human impact consists in the pollution of the oceans by **plastic debris**, which can be found in all oceans from the arctic to the antarctic, from all coasts to the bottom of the seas.

The exhibition “PLASTIC FISHES” is addressing this topic in an artistic way and at the same time it tries to give some scientific background. Short scientific information is accompanying most of the works and gives details on some of the various aspects related with marine plastic debris. The exhibition consists of works on canvas, hanging mobiles and comics. The latter were considered as the most suitable and attractive form to address the very young audience.

The technique used on canvas is a mixed one and a variety of materials has been used: plastic bags and sheets, plastic debris found on the beaches of Galicia, fishing nets and lines, ropes, acrylics, hot-melt adhesive, spray paint and others. “Fish mobiles” were created on the basis of empty plastic water bottles and wire. The comics can be imprinted as large posters.

Not all of the works are dealing with plastic rubbish, some of them are dedicated, for example, to **overfishing**, which is one of the most drastic forms of human impact. It is the aim of this exhibition to contribute to the maintainance of the biodiversity of the oceans and to keep intact the fascinating sea world.

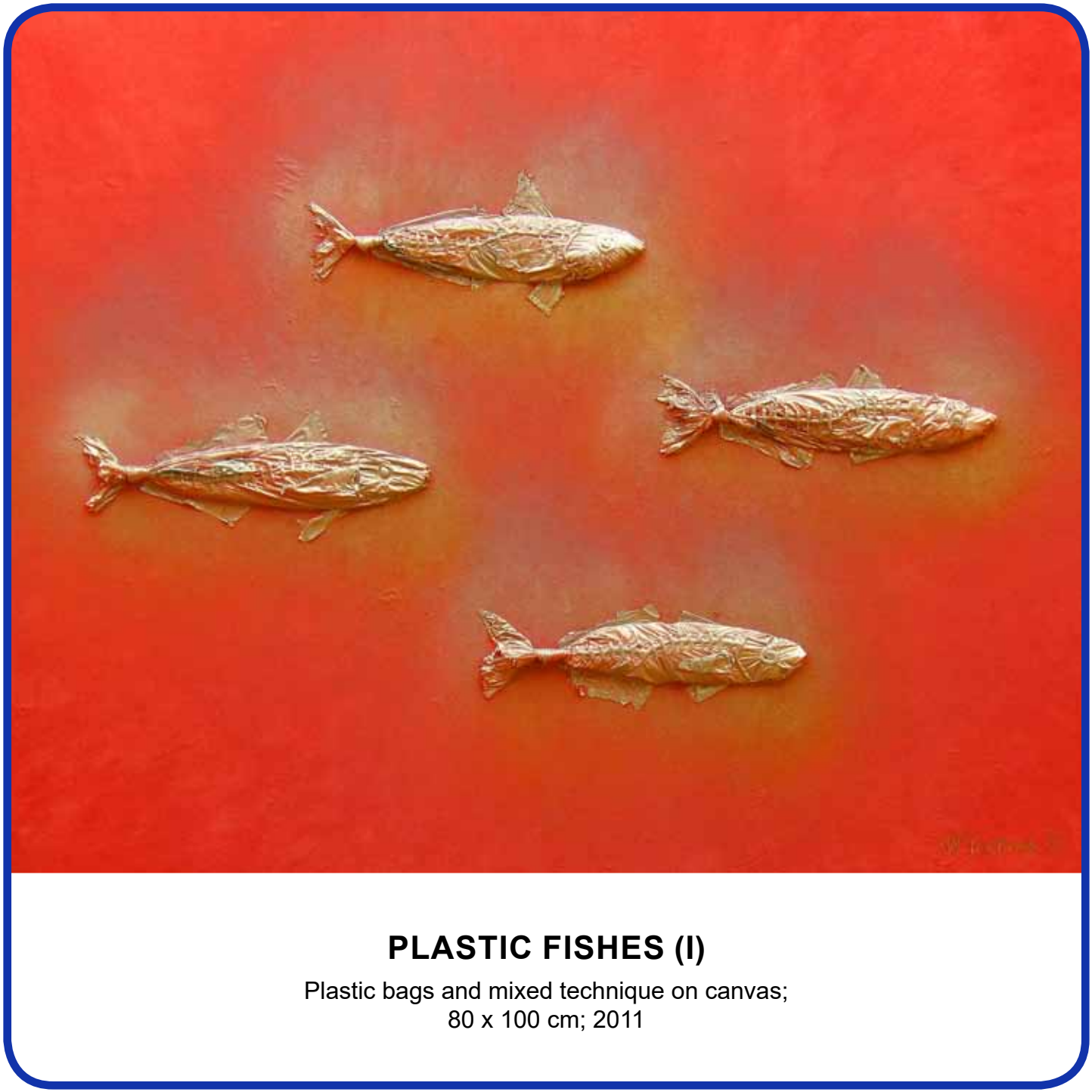
Deceased Laysan Albatross, Midway Atoll (Photo: NOAA) [1]

Plastics on the menu

A large number of marine species has been reported to ingest plastic debris. Among them are: Sea turtles, sea birds, marine mammals (e.g. whales, seals, sea lions), fish and squid.

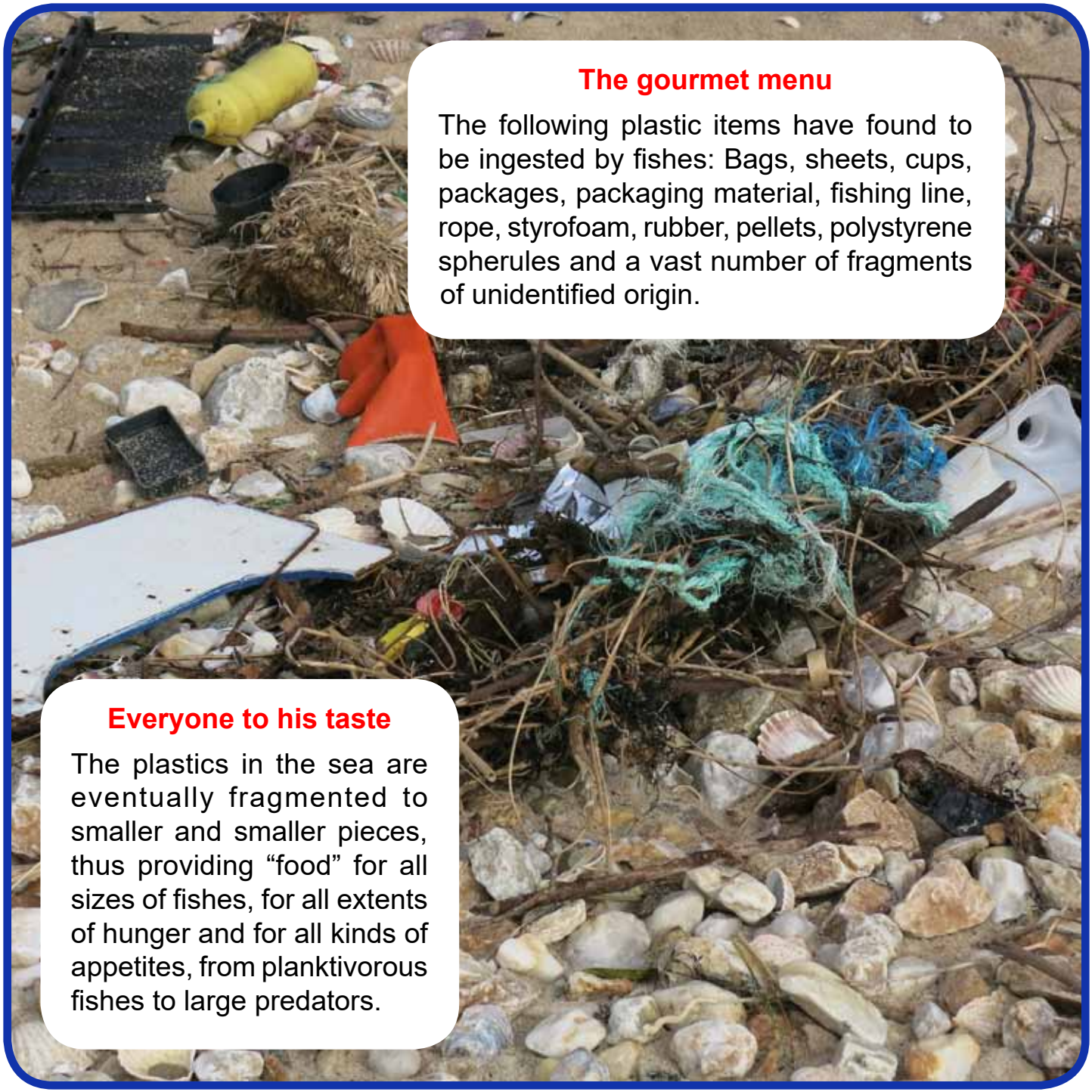
Why do marine animals eat plastics?

The main reason for plastic ingestions may be that the plastic debris is confused for food. Plastic bags and sheets may be mistaken for jellyfish or squid, small fragments (microplastics) for plankton. Many organisms simply may not be able to discriminate plastic from food.



PLASTIC FISHES (I)

Plastic bags and mixed technique on canvas;
80 x 100 cm; 2011



The gourmet menu

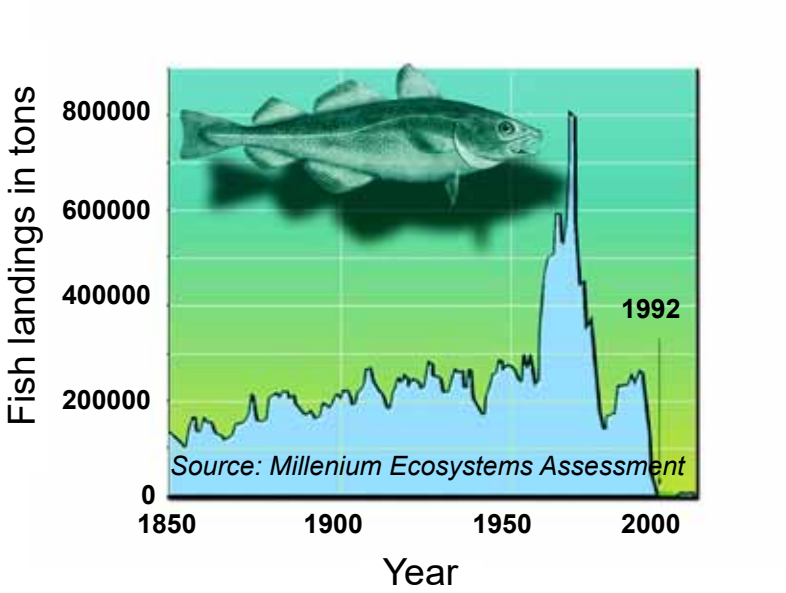
The following plastic items have found to be ingested by fishes: Bags, sheets, cups, packages, packaging material, fishing line, rope, styrofoam, rubber, pellets, polystyrene spherules and a vast number of fragments of unidentified origin.

Everyone to his taste

The plastics in the sea are eventually fragmented to smaller and smaller pieces, thus providing “food” for all sizes of fishes, for all extents of hunger and for all kinds of appetites, from planktivorous fishes to large predators.

PLASTIC FISHES (II)

Plastic bags and mixed technique on canvas;
80 x 100 cm; 2011



Collapse of Atlantic cod landings, East Coast of Newfoundland, 1992 [2]

The end of 500 years of cod fishing

The northwest Atlantic cod fishery abruptly collapsed in 1992, following overfishing since the late 1950s. In 1992 the Canadian government declared a moratorium on the Northern Cod fishery.

Fish versus high tech

From the 1950s onwards new technology allowed fishermen to trawl a larger area, fish to a deeper depth and for a longer time. By the 1960s, powerful trawlers equipped with radar, electronic navigation systems and sonar allowed crews to pursue fish with unparalleled success.

THE LAST COD

Mixed technique and bin liner on canvas;
80 x 100 cm; 2011

The Great Pacific Garbage Patch

In the central North Pacific Ocean the oceanic currents have created a gyre of marine litter. It is characterized by exceptionally high concentrations of plastics and other debris.

A trash(ure) island?

The plastic debris mainly consists of small particles. Form, extension and plastic concentration of the patch may be changing constantly. Similar accumulations also exist in other oceans.

BELOW THE GREAT GARBAGE PATCH

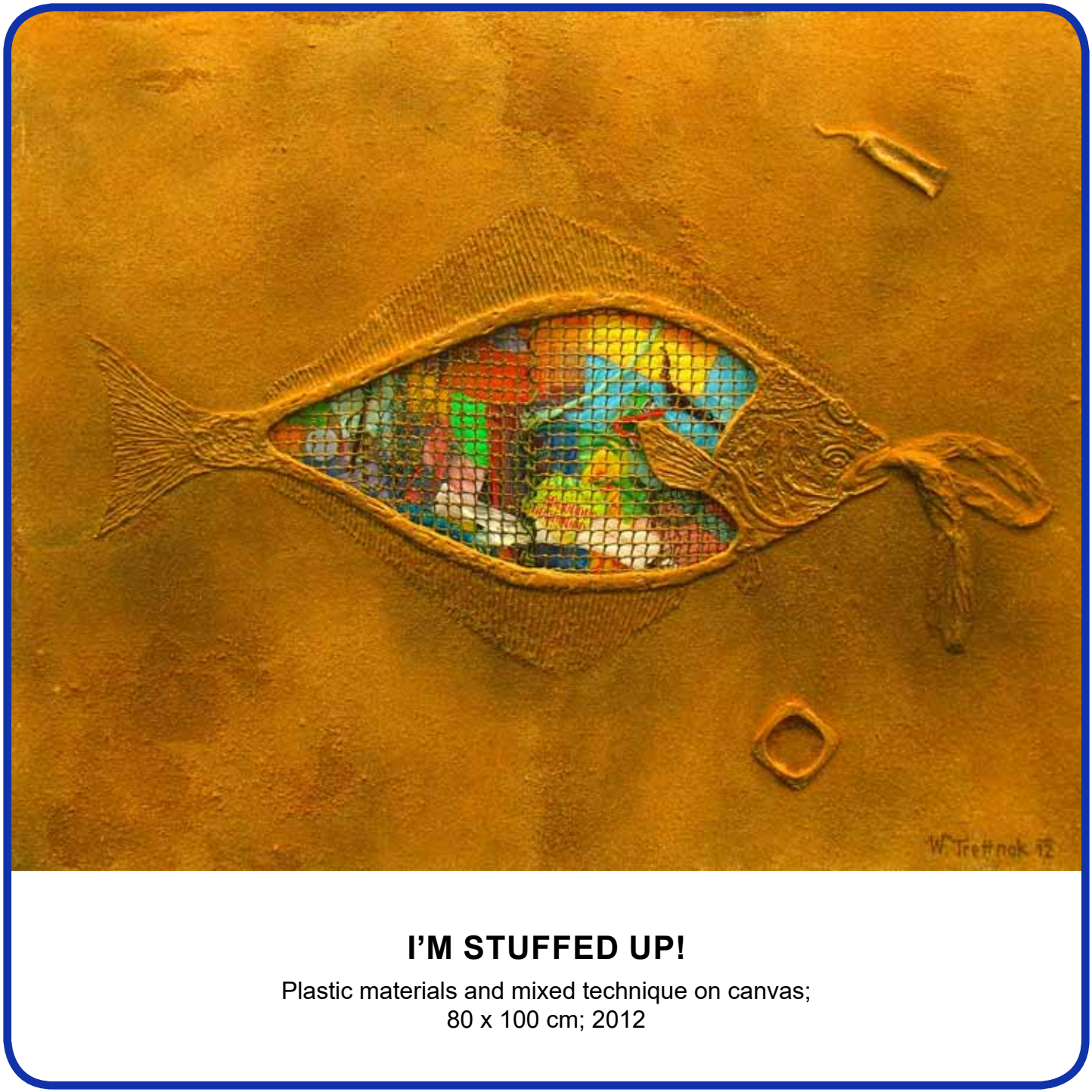
Plastic materials and mixed technique on canvas;
80 x 100 cm; 2012

Cuvier´s beaked whale (NOAA)[3]

Feeding to death

This huge amount of plastic material was found inside a Cuvier's beaked whale (*Ziphius cavirostris*), which was found dead on a beach in the south of Galicia. Most probably, the plastic was the reason for its death.

Acuario de O Grove (Galicia, Spain)



I'M STUFFED UP!

Plastic materials and mixed technique on canvas;
80 x 100 cm; 2012

Tokyo, 5 January 2013

The new year auction at Tokyo's main fish market resulted in the highest price paid for a tuna to date. A Tokyo-based sushi restaurant chain owner paid €1.35 million for a 222-kilo bluefin.

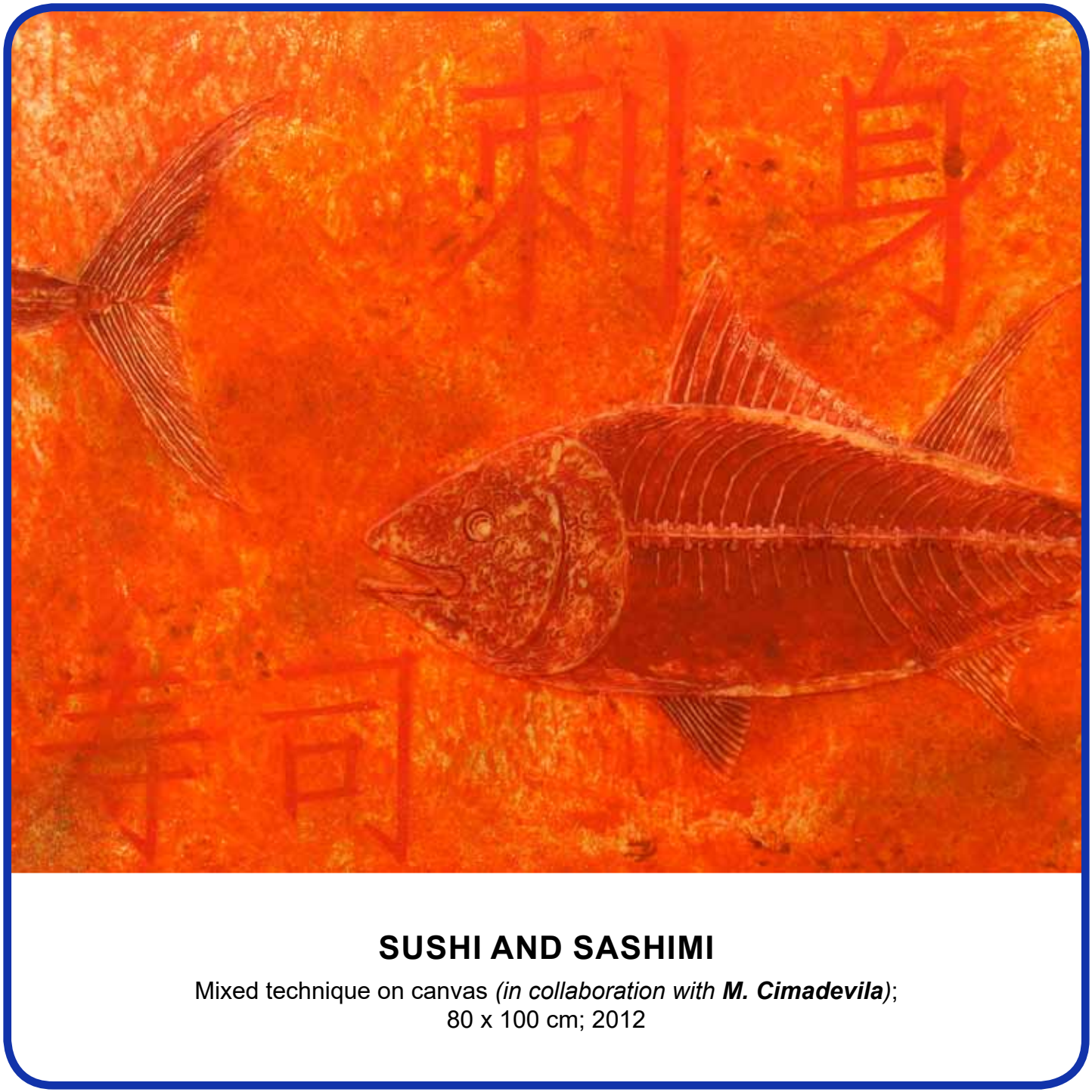
Photo: NOAA [3]

[4, 5]

Swimming delicacies

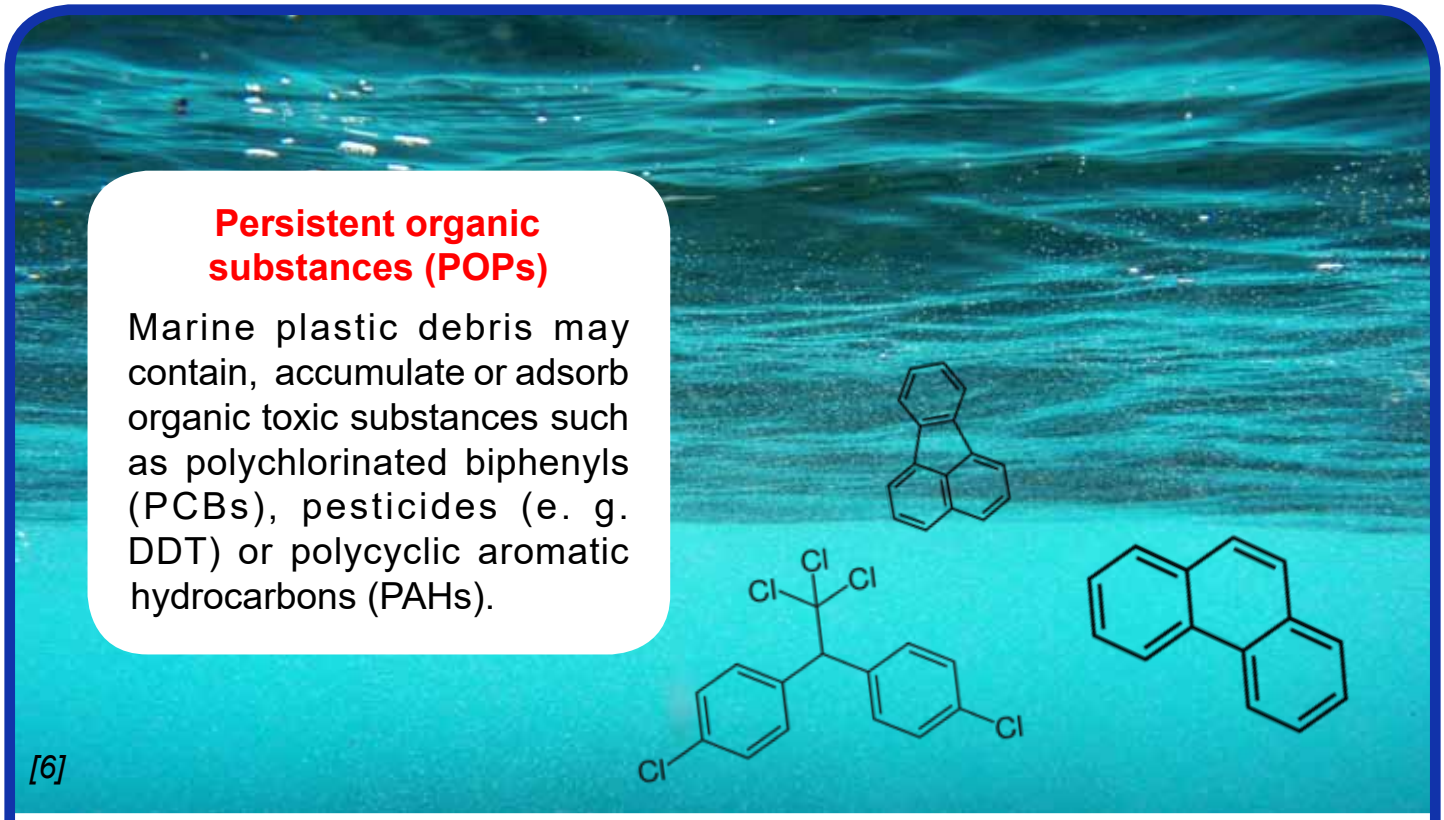
Bluefin tuna populations have declined severely from overfishing and illegal fishing over the past few decades. Population declines have been largely driven by the demand for this fish in high end sushi markets.

worldwildlife.org/species/bluefin-tuna



SUSHI AND SASHIMI

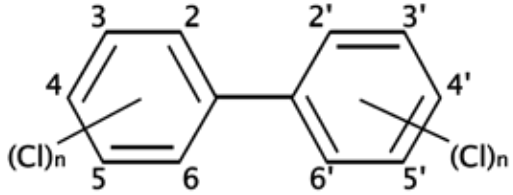
Mixed technique on canvas *(in collaboration with **M. Cimadevila**)*;
80 x 100 cm; 2012



Persistent organic substances (POPs)

Marine plastic debris may contain, accumulate or adsorb organic toxic substances such as polychlorinated biphenyls (PCBs), pesticides (e. g. DDT) or polycyclic aromatic hydrocarbons (PAHs).

[6]



Polychlorinated biphenyl (PCB)

[7 - 10]

Toxic morsels

The POPs ingested with marine plastic debris have a large potential for acting as carcinogenic and mutagenic agents or as endocrine disrupters. The substances may directly affect the organism or may be bioaccumulated, thus also providing risks for human consumers of seafood.

OCEAN OF GHOSTS

Mixed technique on canvas;
80 x 100 cm; 2012

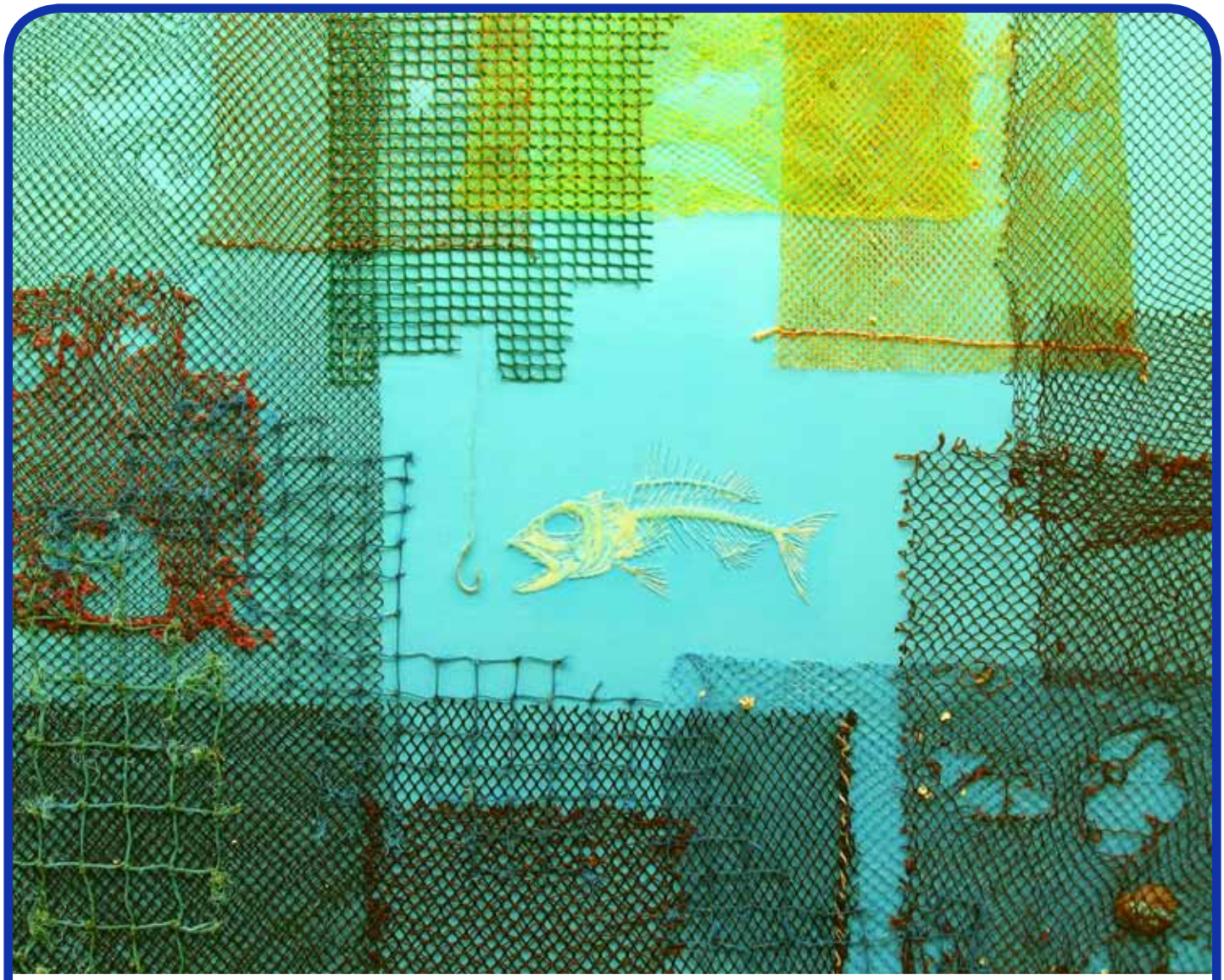
Photos: NOAA [1]

Fishermen's rubbish bin

A significant part of the marine plastic debris consists of derelict fishing gear, which was lost or discarded: nets, traps, pots, lines, ropes, bait boxes and bags, gillnets, floats and other materials.

Ghost fishing

Abandoned fishing nets and pots may continue catching and trapping fishes and other organisms for decades. The nets may be drifting and travelling over large distances during their lifetime.



NETS

Fishing nets, grids and bags and mixed technique on canvas;
80 x 100 cm; 2012

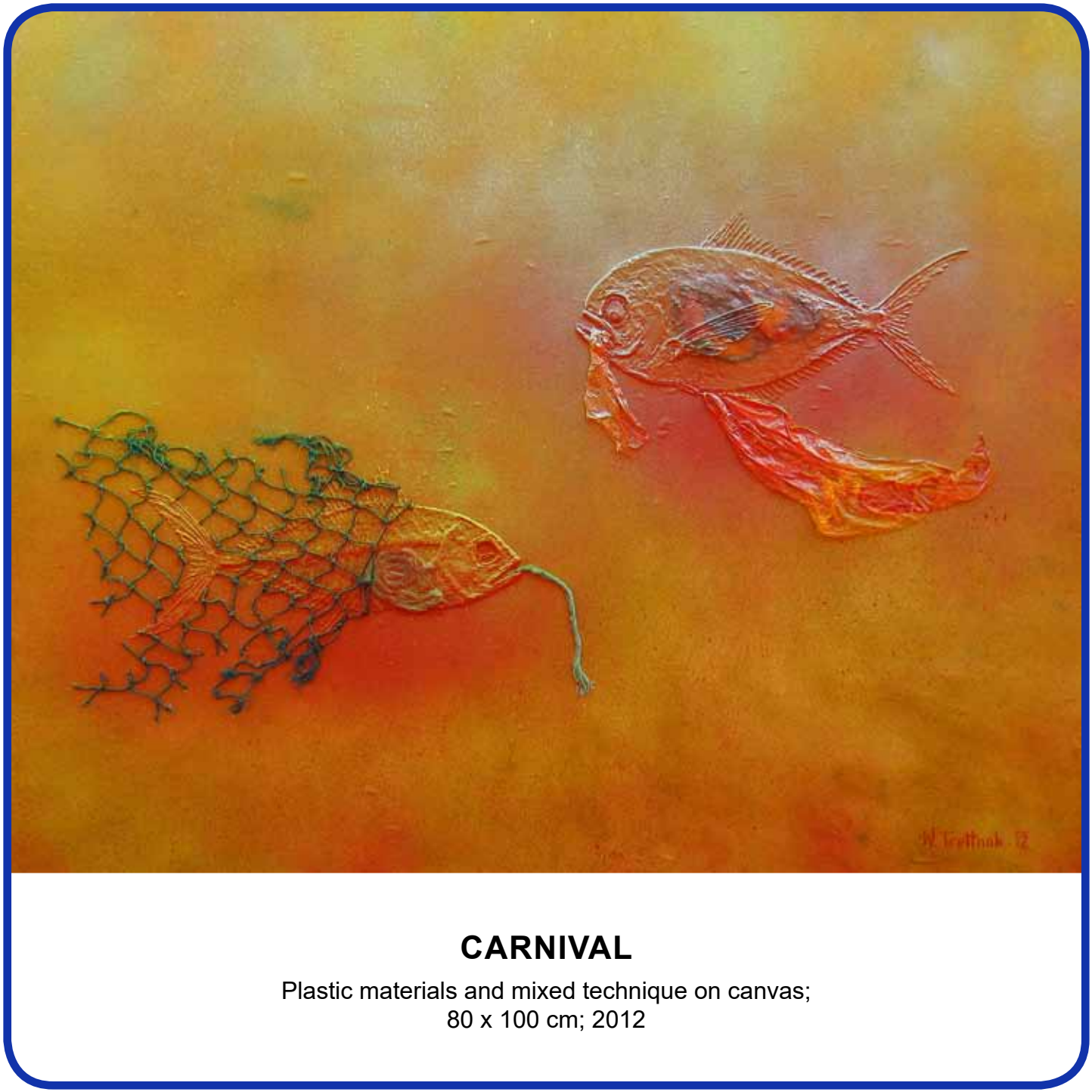
Entangled crab (Photo: NOAA) [1]

Plastic knickknack

Amongst the most dangerous objects in marine debris are derelict fishing nets, pots, traps and ropes, monofilament lines, plastic rings and packaging strapping bands.

Entanglement with plastic material is a wide-spread phenomenon, which has been reported for sea turtles, marine mammals, sea birds and fishes. It may lead to injuries and death of the animal.

Entangled turtle (Photo: NOAA) [1]



CARNIVAL

Plastic materials and mixed technique on canvas;
80 x 100 cm; 2012

Heavy food

Jellyfish belongs to the prey of most of the sea turtles. Plastic bags might be mistaken for jellyfish, but cannot be digested. Even biodegradable plastic cannot be digested fast enough to prevent morbidity and mortality.

Compass jellyfish [11]

Sea turtles

Plastic is the most ingested type of debris found within sea turtles. It can block or injure the digestive tract and result in death of the animal. It presents a serious threat to all sea turtles throughout the world.

JELLYFISH

Plastic bags and mixed technique on canvas;
80 x 100 cm; 2012

Healthy fish?

The intensive aquaculture of salmon is related with ecological and health problems, because of the use of antibiotics and pesticides, fish farm wastes, high levels of contamination found in farmed fish, escaping of farmed fish and diminishing fish stocks through the extensive production of fish meal and fish oil.

Fish cages in Velfjorden, Brønnøy, Norway [12]

Species	**Wild**	**Farmed**
1970	13457	294
1980	12965	5288
1990	10860	225642
2000	4710	895808
2010	2579	1426015

Production of Atlantic salmon in tonnes (FAO Fishery Statistic; www.fao.org)

Which colour do you prefer?

The pink “salmon” colour cannot be produced by the fish itself. Based on “salmon colour charts”, synthetically produced dyes are added to the diet of farmed salmon in order to satisfy the consumers, who “buy with their eyes”.

FISH ON DEMAND

Mixed technique on canvas *(in collaboration with **M. Cimadevila**)*;
80 x 100 cm; 2014

[13]

100 million sharks

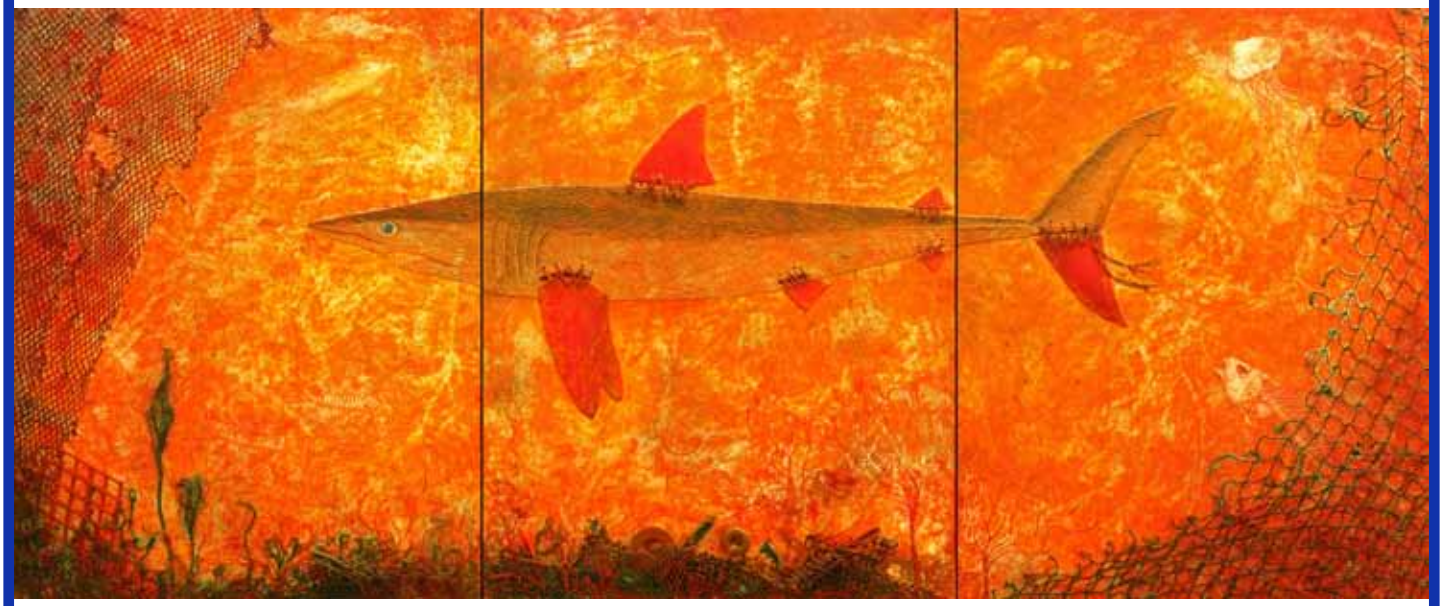
is the estimated global mortality due to fishing activities in 2000. The depletion of shark populations around the world is largely due to the high demand for shark fins in the Asian market. Caught sharks are often discarded at sea alive after removing their fins.

Worm et al.,
Marine Policy 40 (2013) 194-204

A Chinese delicacy

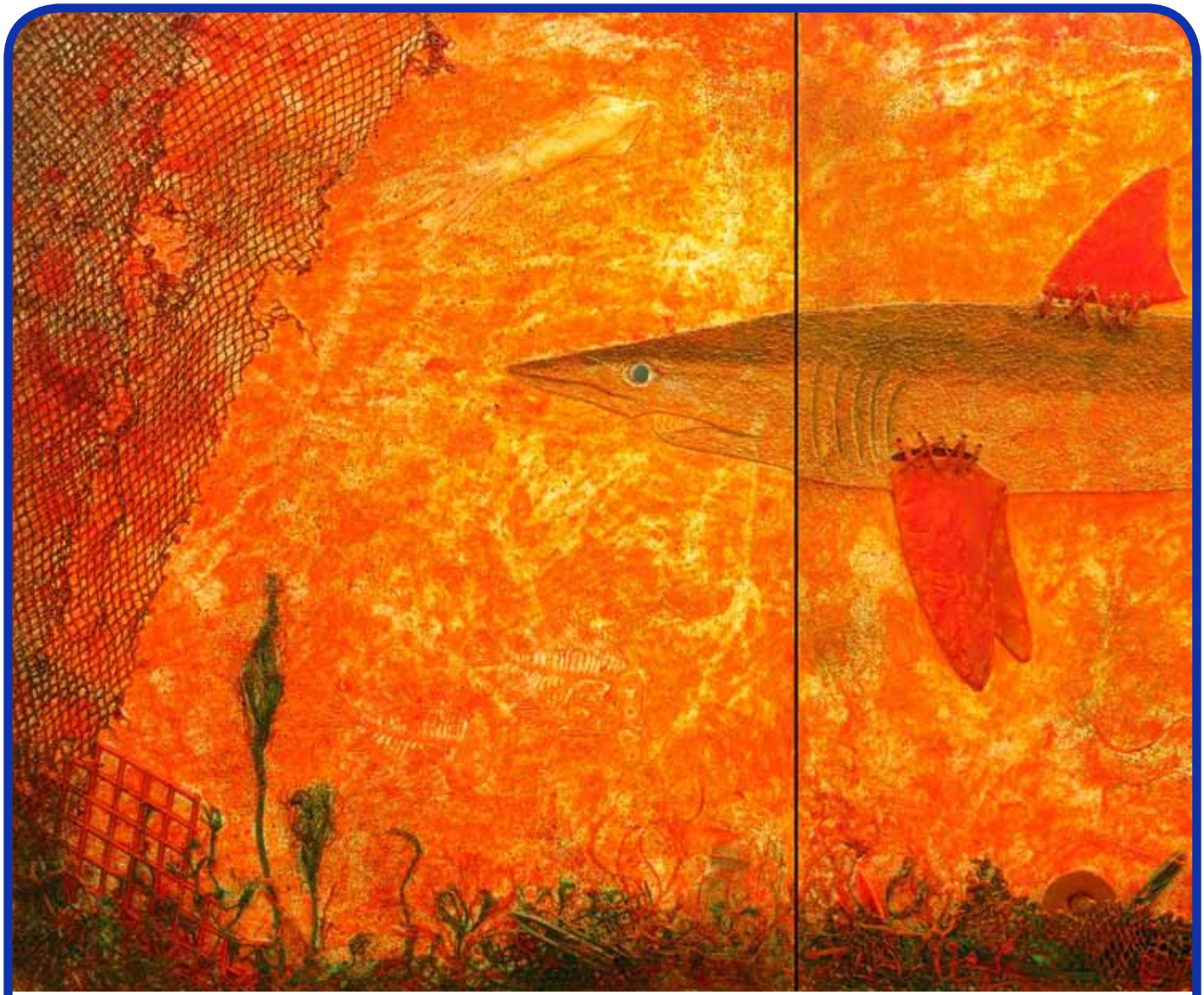
Shark fin soup is considered a delicacy and luxury item in China. Almost mythical properties regarding health benefits have been ascribed by Chinese medicine to shark fins, which are among the most expensive seafood products worldwide.

Shark fin soup [14]



SHARK FIN SOUP

Mixed technique on canvas *(in collaboration with **M. Cimadevila**)*;
100 x 240 cm (3 pieces with 100 x 80 cm each); 2014



SHARK FIN SOUP (1)

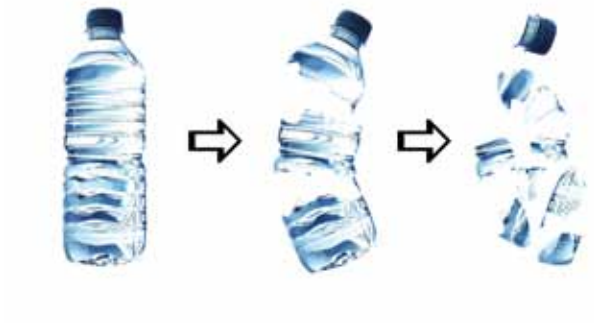
Mixed technique on canvas *(in collaboration with **M. Cimadevila**)*;
100 x 240 cm; 2014

SHARK FIN SOUP (2)

Mixed technique on canvas *(in collaboration with **M. Cimadevila**)*;
100 x 240 cm; 2014

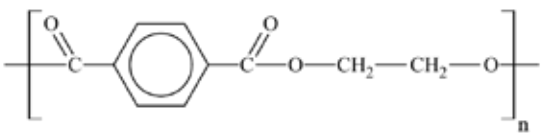

[15]

Plastic bottles constitute a major part of marine plastic debris. Plastic beverage bottles consist mainly of polyester, which is strong, durable and chemically and thermally stable.



No biodegradation!

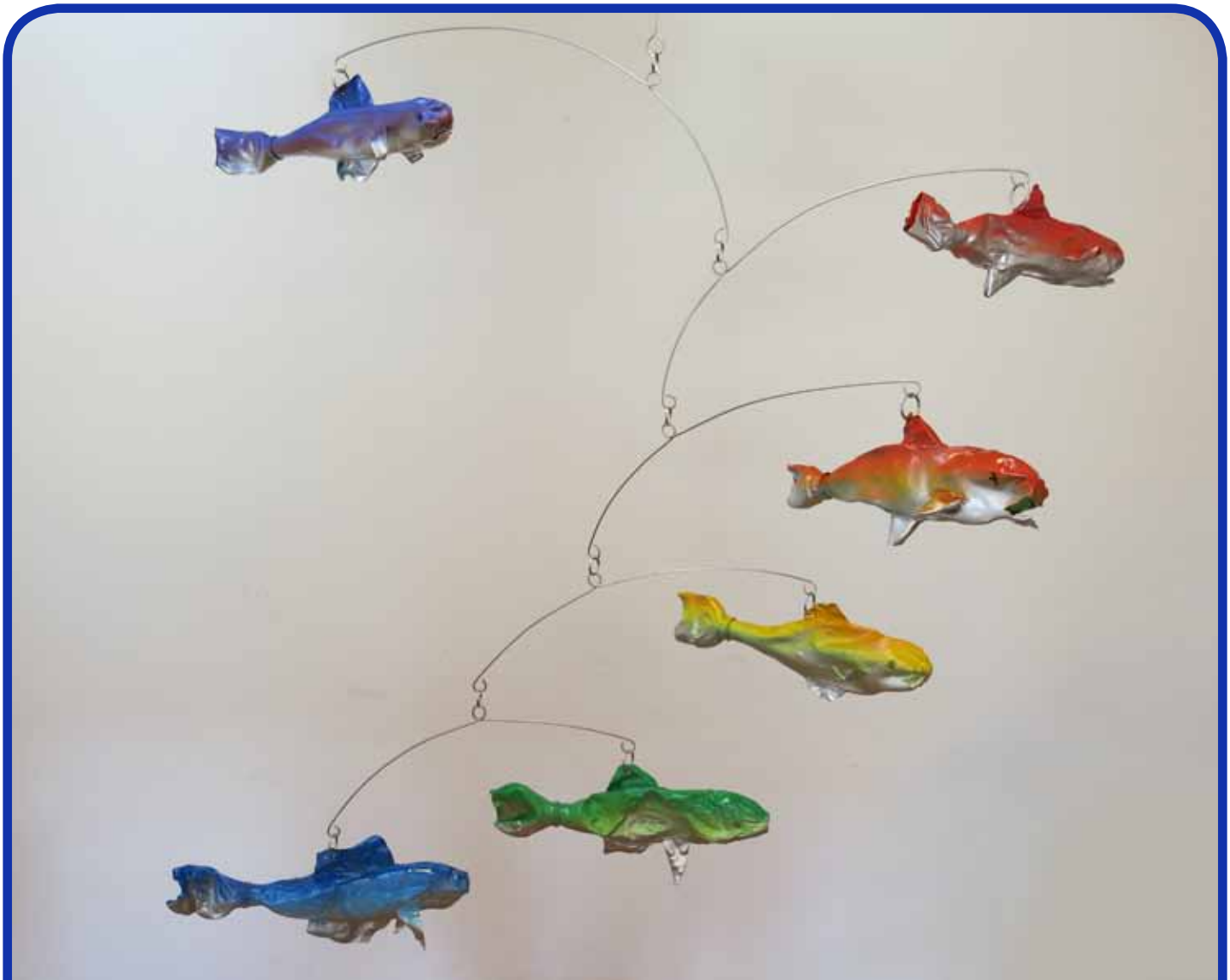
Plastic bottles in the sea are not degraded, but are fragmented to smaller and smaller pieces. The polyester used is highly resistant to biodegradation. The estimated time for its degradation is about 450 years.



Polyethylene terephthalate (PET) [16]

PLASTIC FISHES (III)

Plastic water bottles, wire, spray paint;
ca. 120 (height) x 125 (Ø) cm; 2012



PLASTIC FISHES (IV)

Plastic water bottles, wire, spray paint;
ca. 140 (height) x 120 (Ø) cm; 2014

European plastic facts*

The total European plastics demand in 2012 was 45,9 million tonnes. Packaging applications made up 39,4 % of this figure, with 6,5 % (3 million tonnes) constituting PET, which is mainly used for beverage, food and other liquid containers.

What a waste!

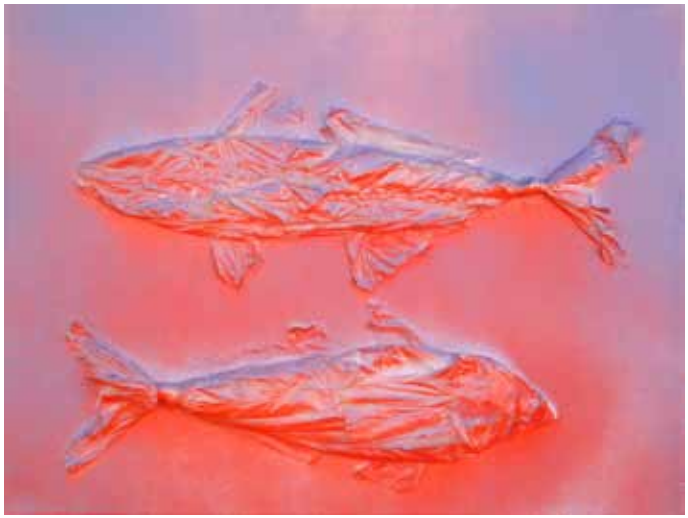
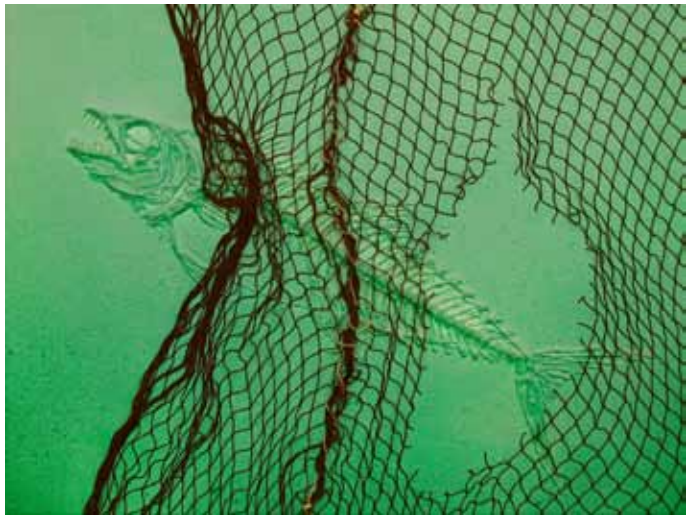
The post-consumer plastics waste in Europe in 2012 amounted to 25,3 million tonnes. Only 26,3 % of these plastics were recycled and 38,1 % finished up disposed in landfills.*

Approximately 80% of marine litter is land-based.

**"Plastics - the Facts 2013"; EU countries + Norway and Switzerland; www.plasticseurope.org*

PLASTIC SEA LIFE

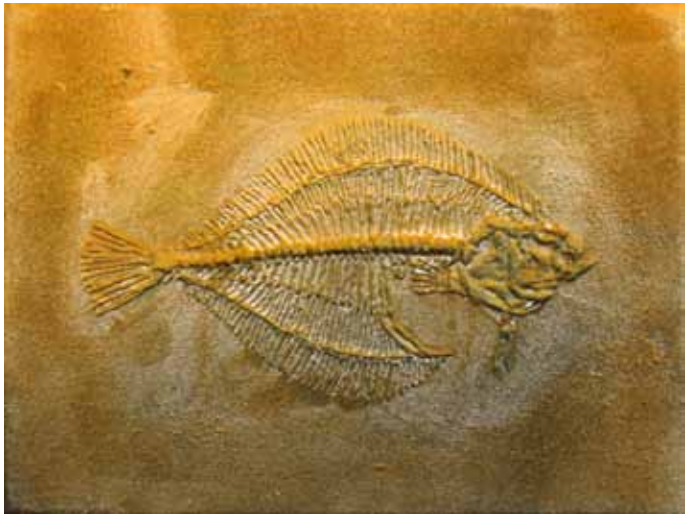
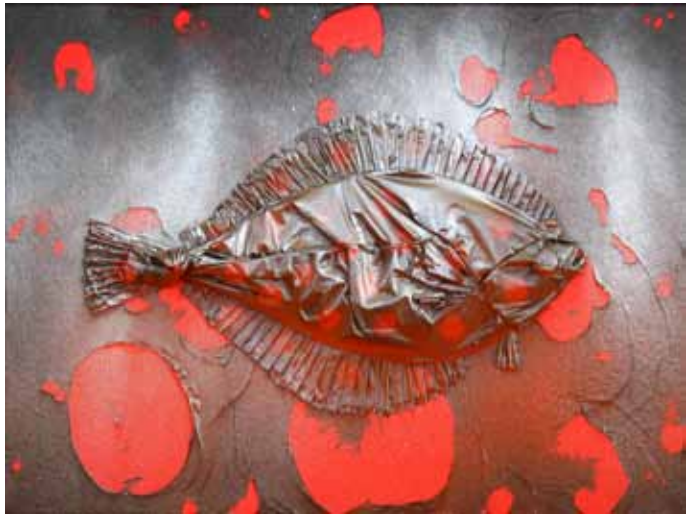
Mixed technique on canvas;
16 pieces with 30 x 40 cm each; 2011 - 2013

PLASTIC SEA LIFE (1 - 4)

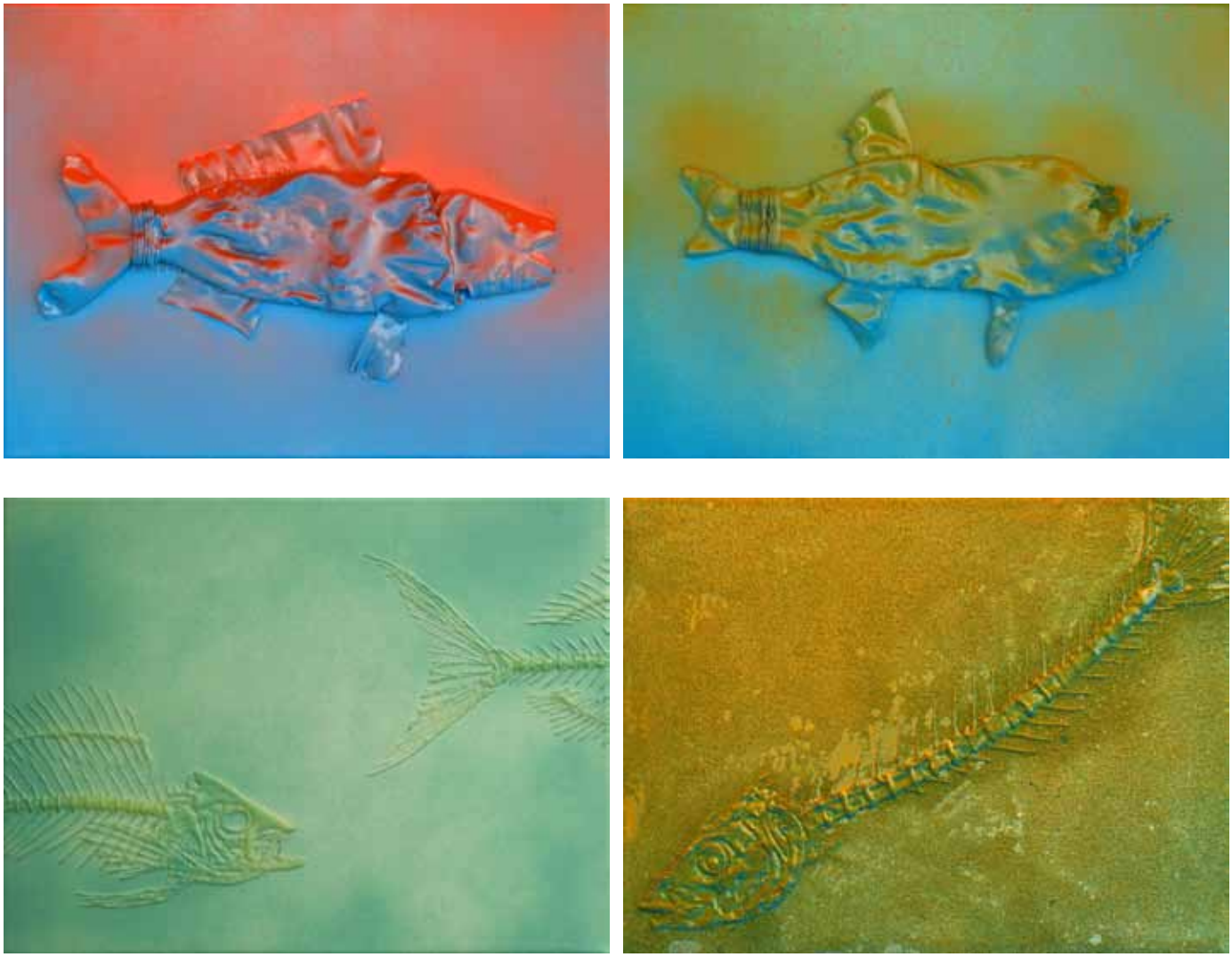
Mixed technique on canvas *(Nr. 3 in collaboration with **M. Cimadevila**)*;
30 x 40 cm; 2011 - 2013



PLASTIC SEA LIFE (5 - 8)

Mixed technique on canvas *(Nr. 5 in collaboration with **M. Cimadevila**)*;
30 x 40 cm; 2011 - 2013

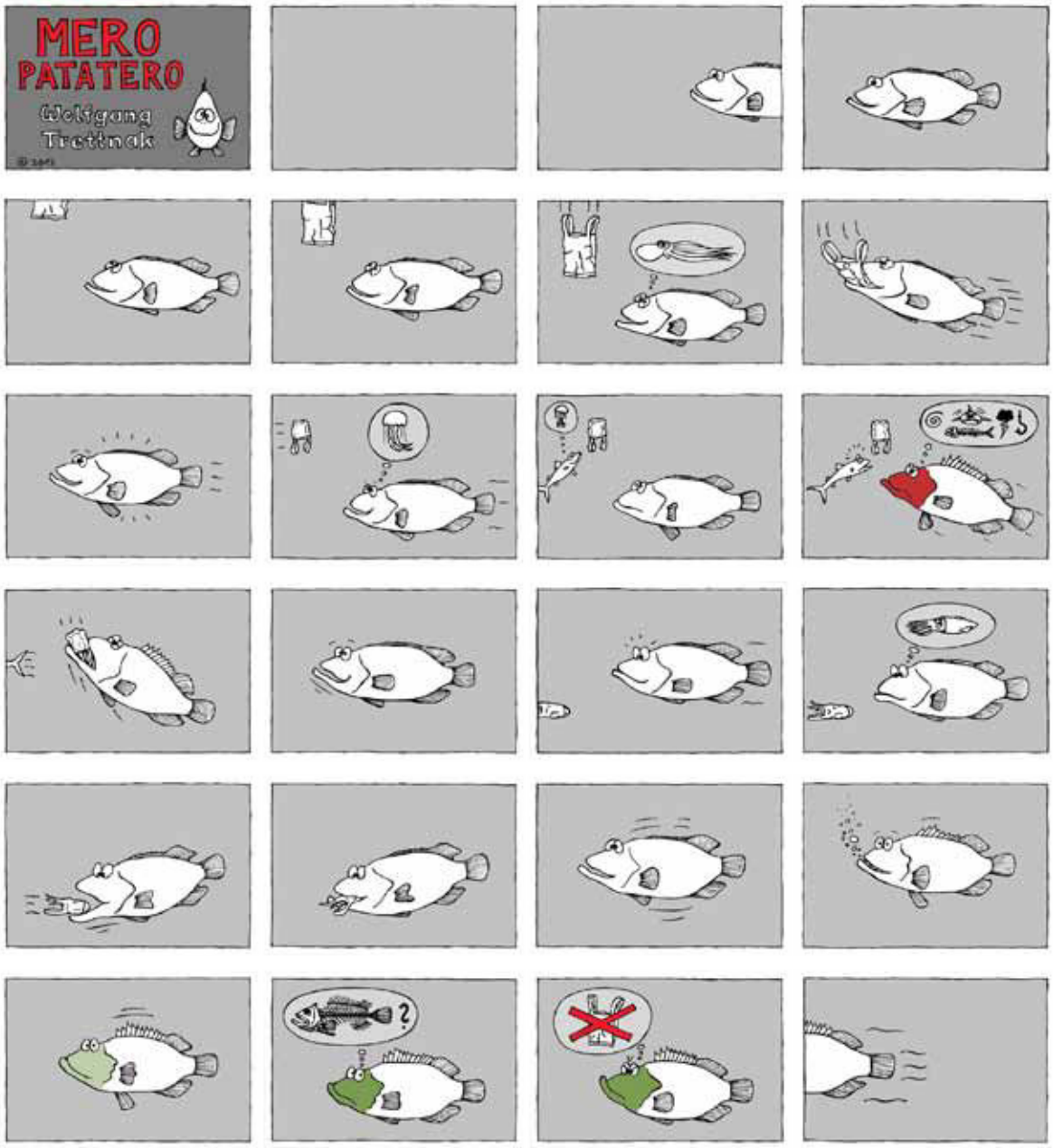


PLASTIC SEA LIFE (9 - 12)

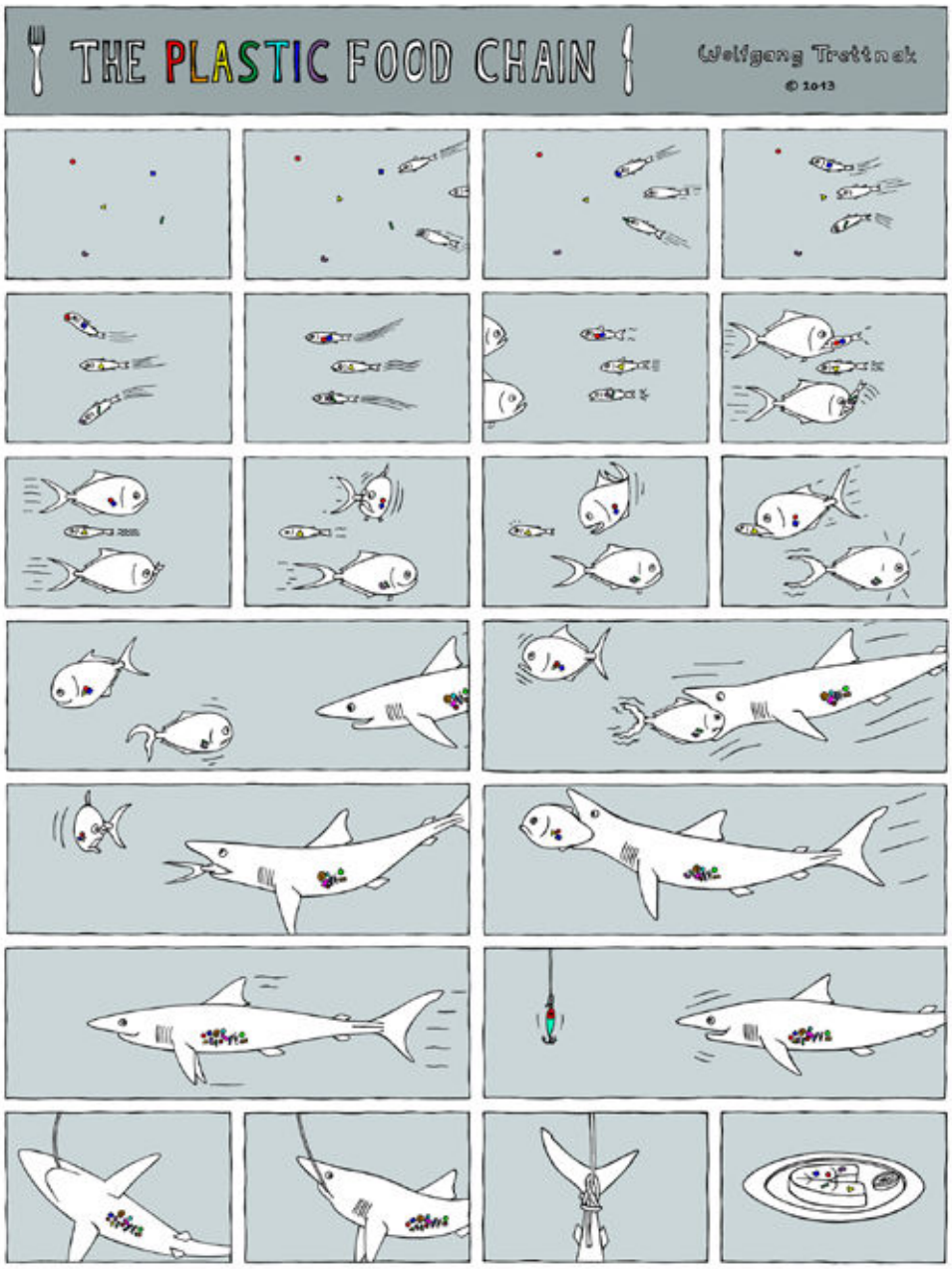
Mixed technique on canvas;
30 x 40 cm; 2011 - 2013

PLASTIC SEA LIFE (13 - 16)

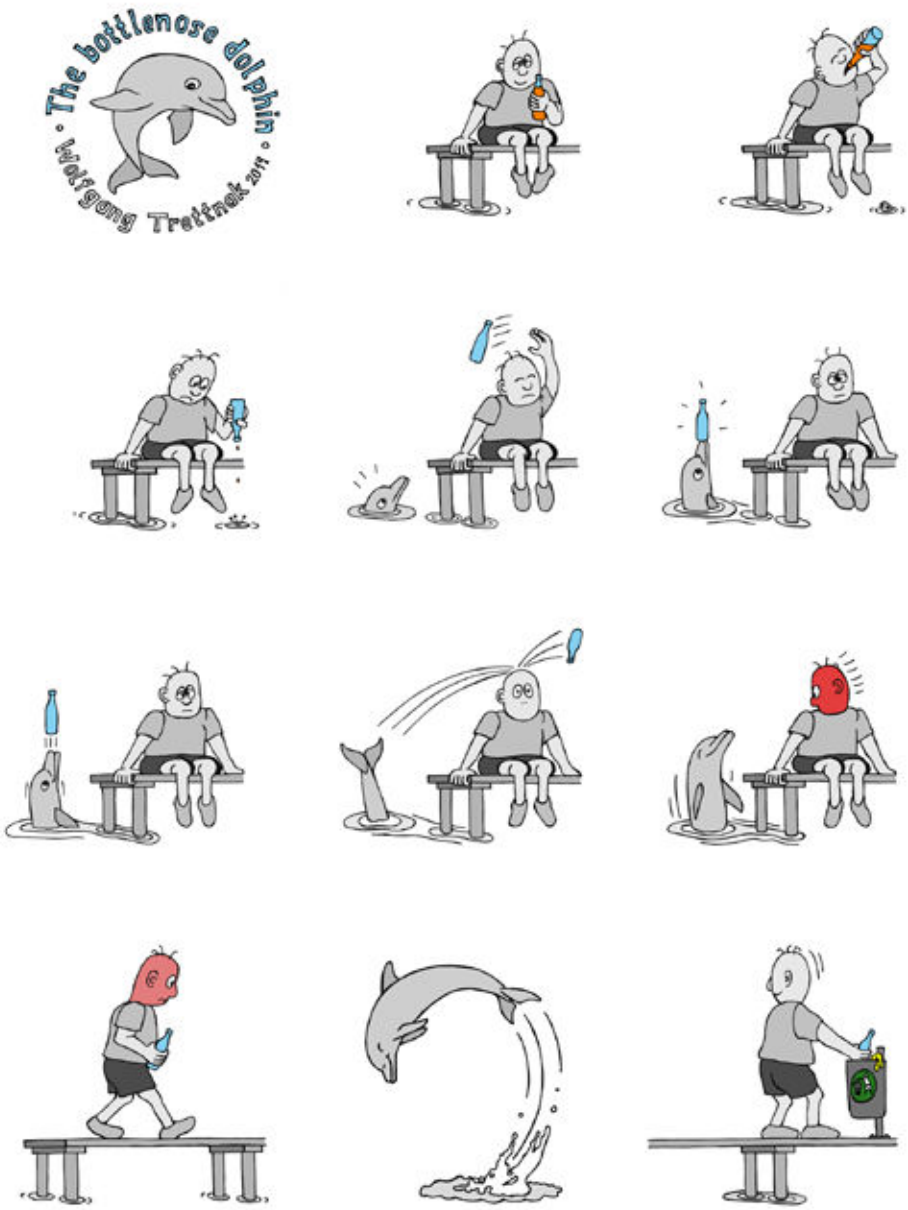
Mixed technique on canvas;
30 x 40 cm; 2011 - 2013



MERO PATATERO - Colour print; 70 x 50 cm; 2012



THE PLASTIC FOOD CHAIN - Colour print; 70 x 50 cm; 2013



THE BOTTLENOSE DOLPHIN - Colour print; 70 x 50 cm; 2014

References (Illustrations)

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12. Fish cages in Velfjorden, Brønnøy, Norway. Thomas Bjørkan (2010). https://commons.wikimedia.org/wiki/File:Fish_cages.jpg (CC-BY-SA-3.0)
13. Fresh shark fins drying on sidewalk at Hong Kong. Cloneofsnake (2011). https://commons.wikimedia.org/wiki/File:Shark_fins_Hong_Kong.jpg (CC-BY-SA-2.0)
14. Shark fin soup (2007). https://commons.wikimedia.org/wiki/File:Chinese_cuisine-Shark_fin_soup-07.jpg (CC-BY-SA-2.0)
15. Polluted Beach on the Red Sea in Sharm el-Naga, Port Safaga, Egypt. Vberger (2010). https://commons.wikimedia.org/wiki/File:Beach_in_Sharm_el-Naga03.jpg (public domain)
16. Polyethylene terephthalate. Rohieb (2007). https://commons.wikimedia.org/wiki/File:Polyethylene_terephthalate.svg (GNU FDL, CC-BY-SA)

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