Soil Water Wildlife* and Plastic Don't Mix

*Includes humans

Dec. 5, 2024 NSC RCD

Presenters

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Sierra Club & Community for Natural Play Surfaces

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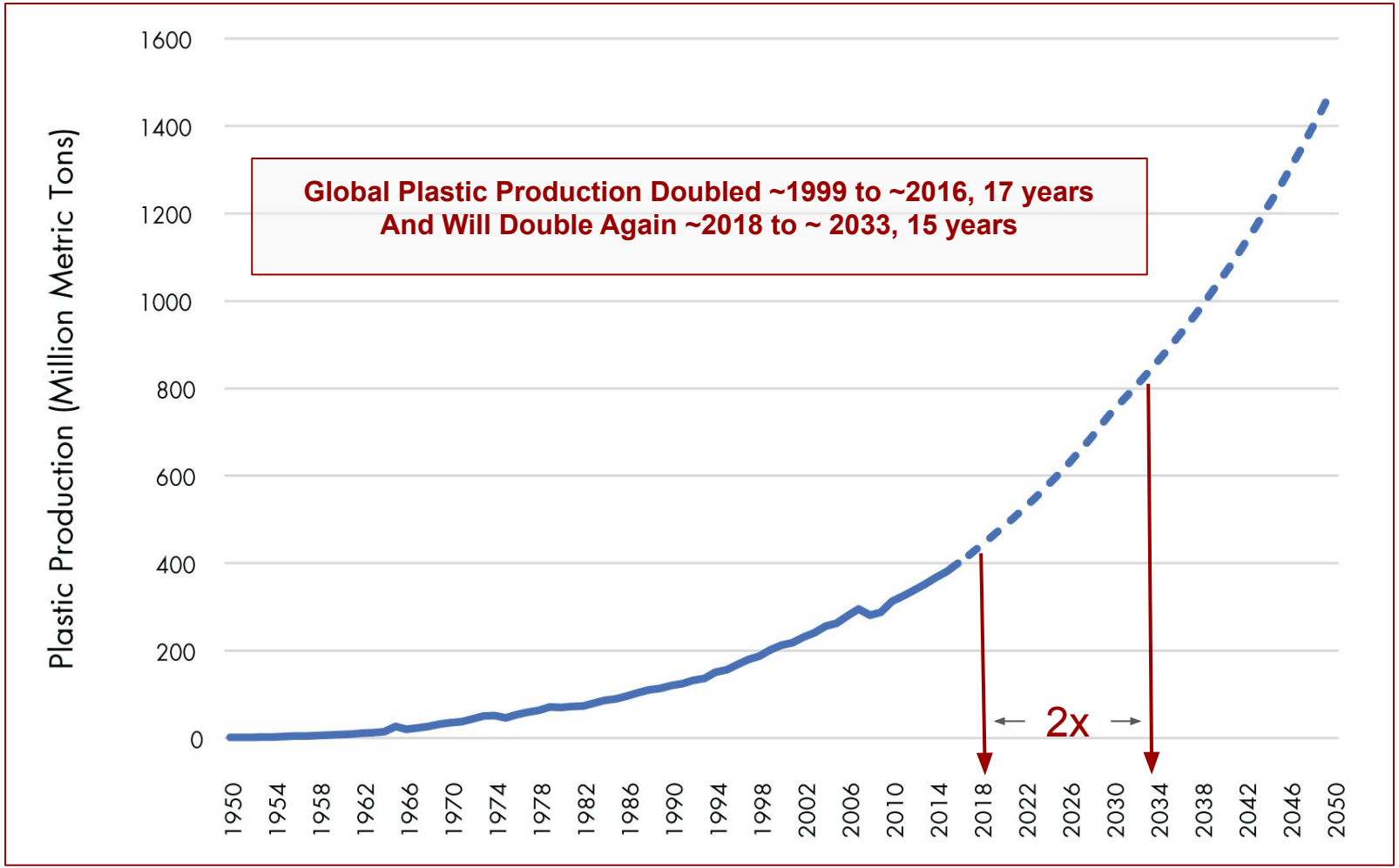
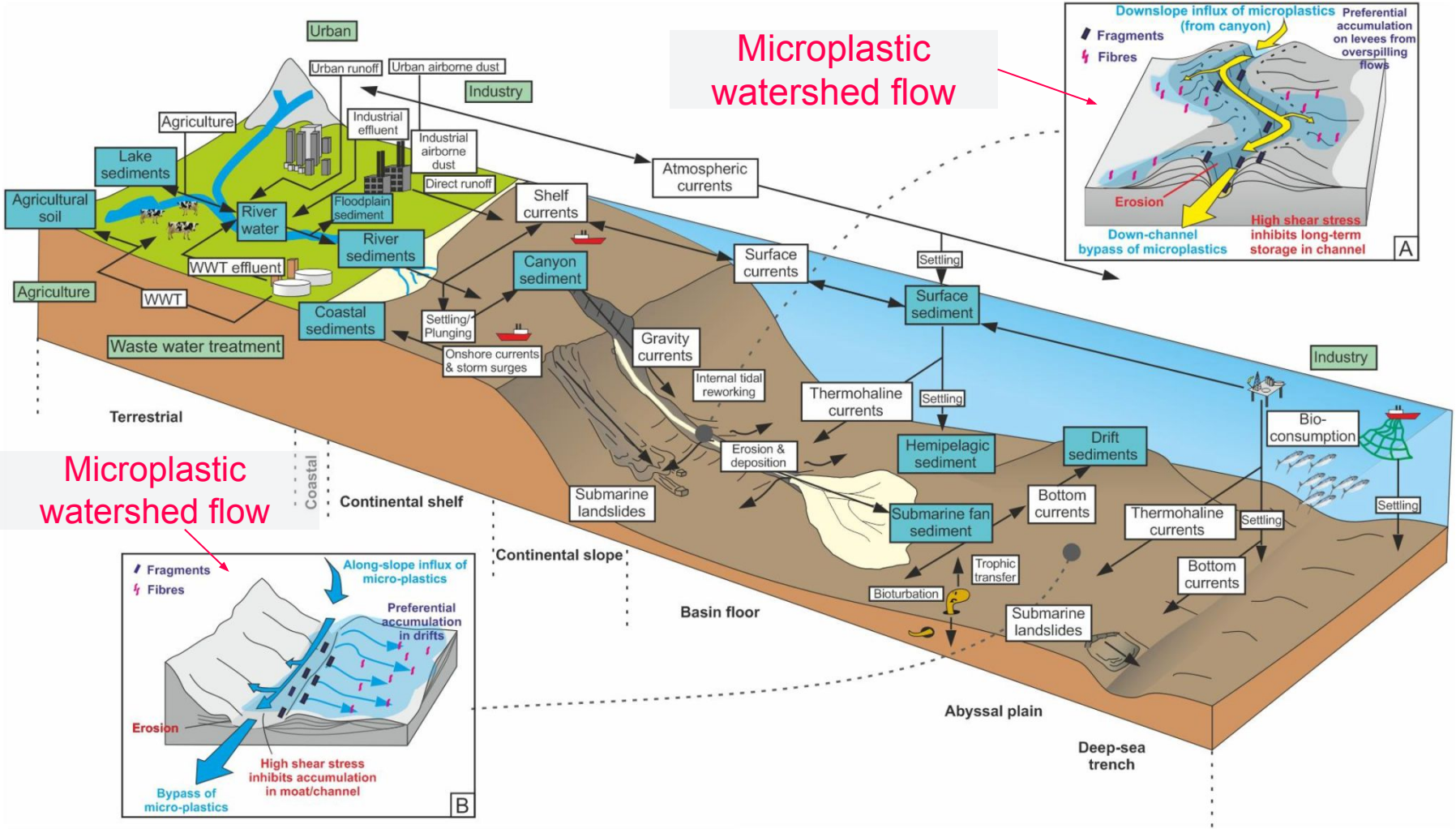
Agenda

- Plastic is a problem
  - The threat from microplastics to
    - Water
    - Soil
    - Health
- Artificial turf is plastic, with a twist
  - The danger of PFAS “forever” chemicals
  - Heat and safety
- Are there viable alternatives to artificial turf?
- The precautionary principle
- Questions



The National Academies of Sciences, https://nap.nationalacademies.org/resource/other/dels/plastics-in-the-ocean/



Dispersion, Accumulation, and the Ultimate Fate of Microplastics in Deep-Marine Environments, Frontiers In Earth Science, 2019

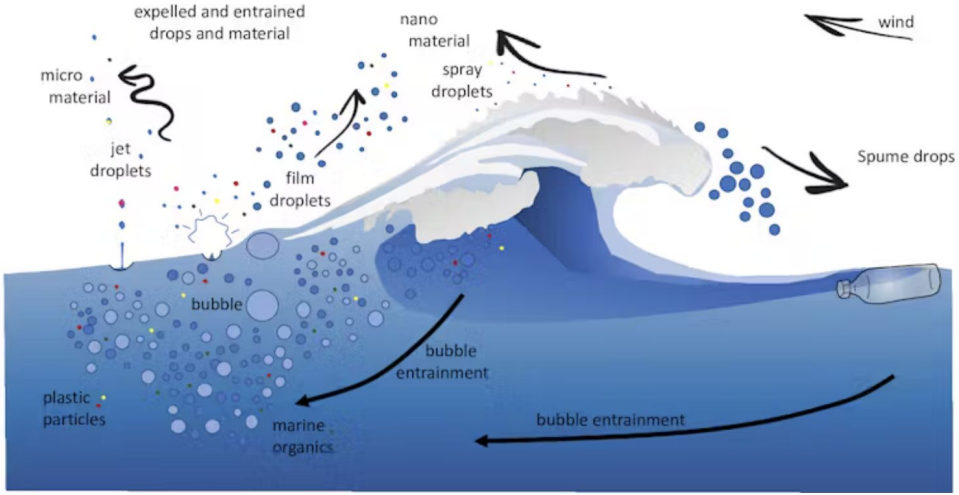
The Guardian

Microplastics found in dolphin breath for first time – study

Research suggests the marine animals are inhaling pollutants when they come up for air, with even rural populations affected

Bottlenose dolphins were studied at two sites in the US, in Florida and Louisiana. Photograph: Stephen Frink/Getty Images

GREENPEACE

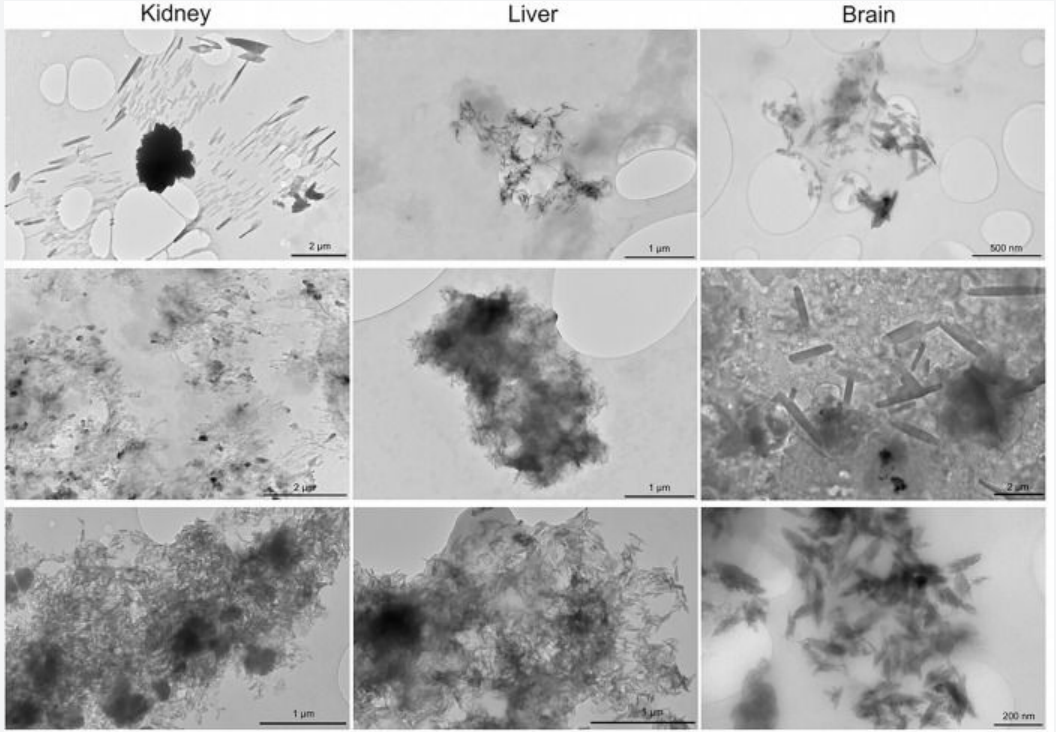


The ocean releases microplastics into the air through surface froth and wave action. Once the particles are released, wind can transport them to other locations. Steve Allen, CC BY-SA

In fact, bubble bursts caused by wave energy can release 100,000 metric tons of microplastics into the atmosphere each year. Since dolphins and other marine mammals breathe at the water's surface, they may be especially vulnerable to exposure.

May 6, 2024, University of New Mexico. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC11100893/

Bioaccumulation of Microplastics in Decedent Human Brains Assessed by Pyrolysis Gas Chromatography-Mass Spectrometry



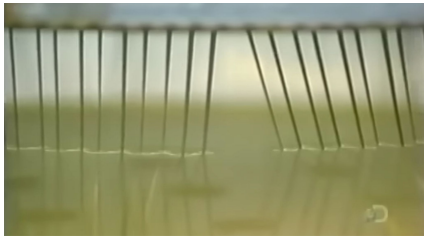
Polyethylene was the predominant polymer; **the relative proportion of polyethylene MNPs was greater in brain samples than in liver or kidney** … Shard-like appearances, with dimensions ranging from micrometer to nanometer sizes, suggest an aged, friable polymer composition.

What is Artificial Turf?

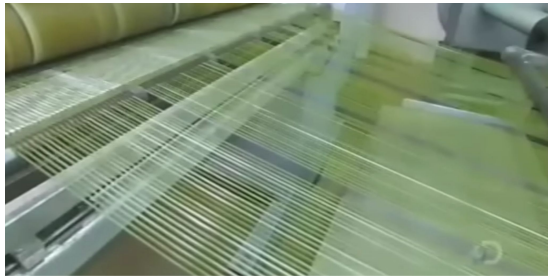
- Plastic grass on a plastic backing with “infill” to hold the blades up

Plastic Pellets into Blades

1.Clear base, color, stabilizers, additives



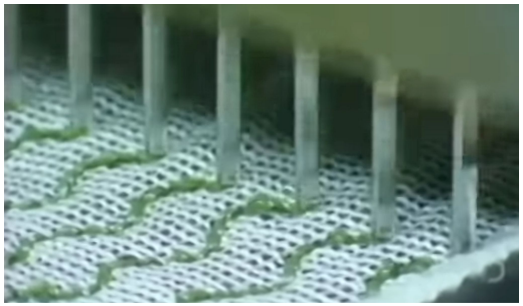
2. Melted, extruded, cooled



4. Rolled, stretched

5. Spooled

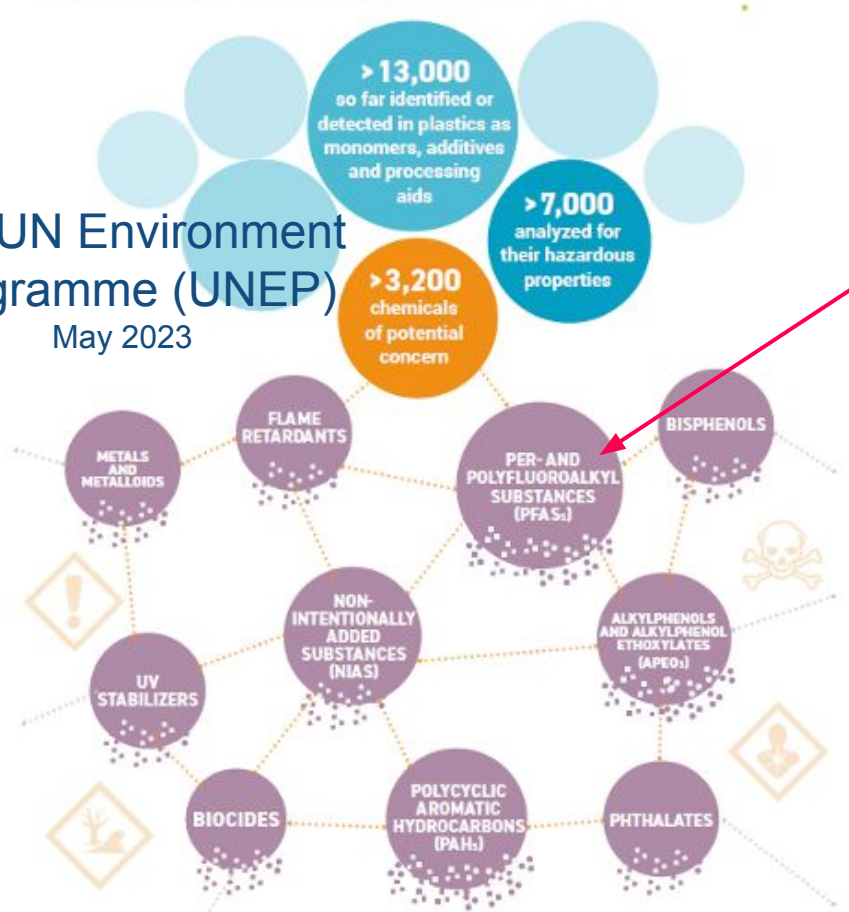
6. Twisted into yarn



7. Stitched

8. Cut underneath, blades

CHEMICALS OF CONCERN IN YOUR PLASTICS



The UN Environment Programme (UNEP)
May 2023

In Artificial Turf

The President and CEO of the Synthetic Turf Council has admitted to PFAS in synthetic turf in a letter sent to Senator Ben Allen in June of 2023.[42]

100% of synthetic turf tested contains PFAS.[43] A partial list of PFAS found in synthetic turf and components to date (from public records):

- PFOS
- PFOA
- 6:2 FTSA
- GenX
- D3-N-MeFO SAA
- D2-N-EtFO SAA
- PFPeA
- PFHxA
- PFHpA
- PFBS
- PFBA
- PFNA
- PFDA
- PFHxS
- PPF Acid
- R-EVE
- PTFE
- PVDF
- 13C2-4:2 FTS
- 12C2-6:2 FTS
- 13C2-8:2 FTS
- 8:2 FTOH
- PMPA

Additional Chemicals of Concern: (not comprehensive)

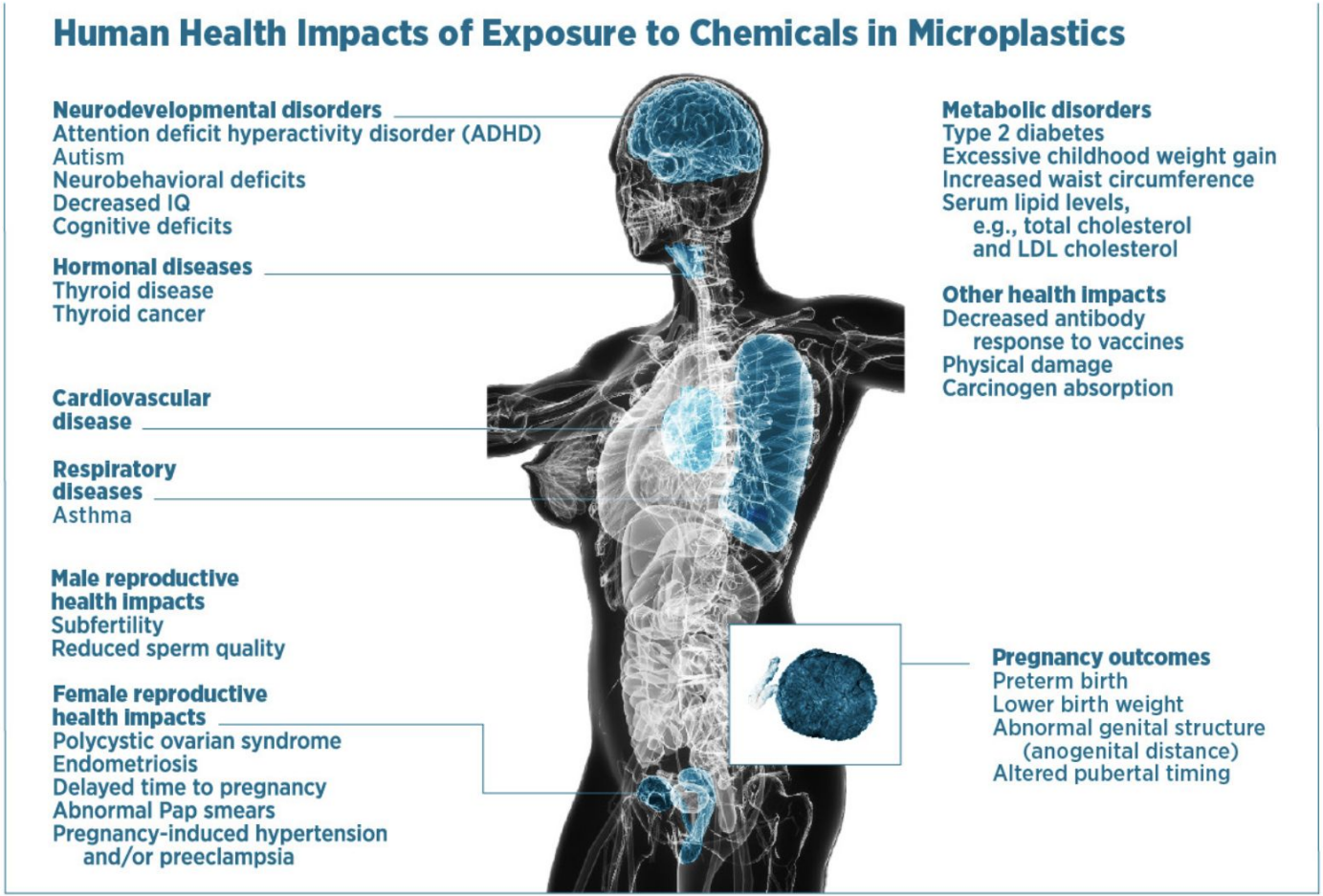
In synthetic turf:

- Phthalates
- Latex
- Polyvinyl chloride
- Naptha
- Siloxanes
- Talc
- Di/Isocyanates
- Formaldehyde
- Fungicides
- Flame retardants
- Coal fly ash
- e 1,2-cyclohexane dicarbonic acid
- Dibutyltin
- Ethylene glycol
- Triclosan

References

42) https://drive.google.com/file/d/1gnotC4ju6HdbPTnI9fvD4G68Q8a04Ien/view?usp=drivesdk

43) https://www.newmoa.org/wp-content/uploads/2023/02/PFAS-in-Artificial-Turf.pdf

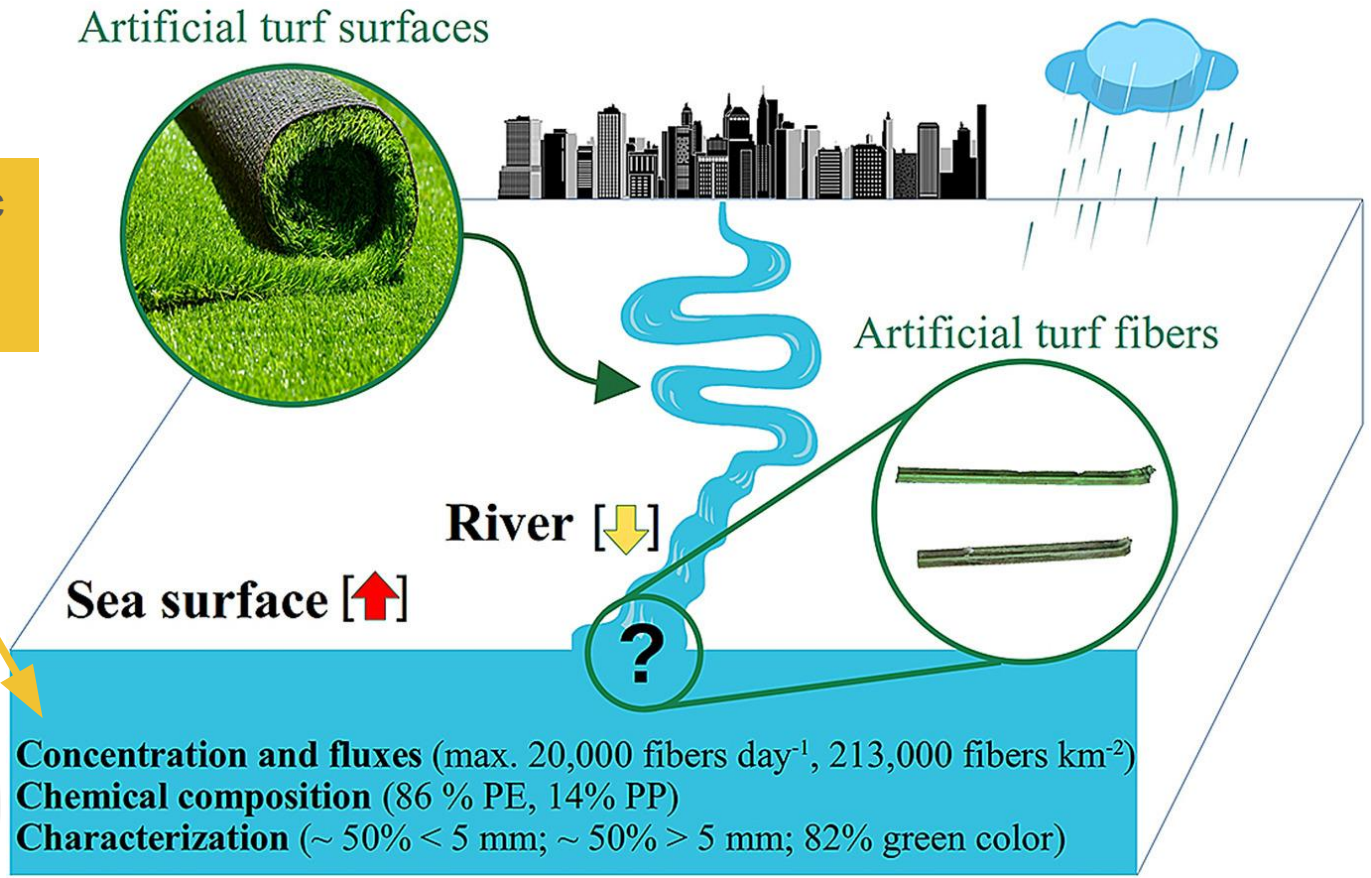


Source: Based on visuals from a 2021 report by the United Nations Environment Programme, titled "From Pollution to Solution").

Center for International Environmental Law https://www.ciel.org/breathing-plastic-the-health-impacts-of-invisible-plastics-in-the-air/

2023 University of Barcelona Study

50% of ALL plastic samples included artificial turf



Manufacturer warranty

MANUFACTURER'S LIMITED

WARRANTY

With an enduring reputation for innovation and quality in manufacturing, EasyTurf is proud to extend to you FieldTurf's industry-best, eight-year, non-prorated limited warranty on all FieldTurf manufactured products.

FieldTurf products are warrantied against

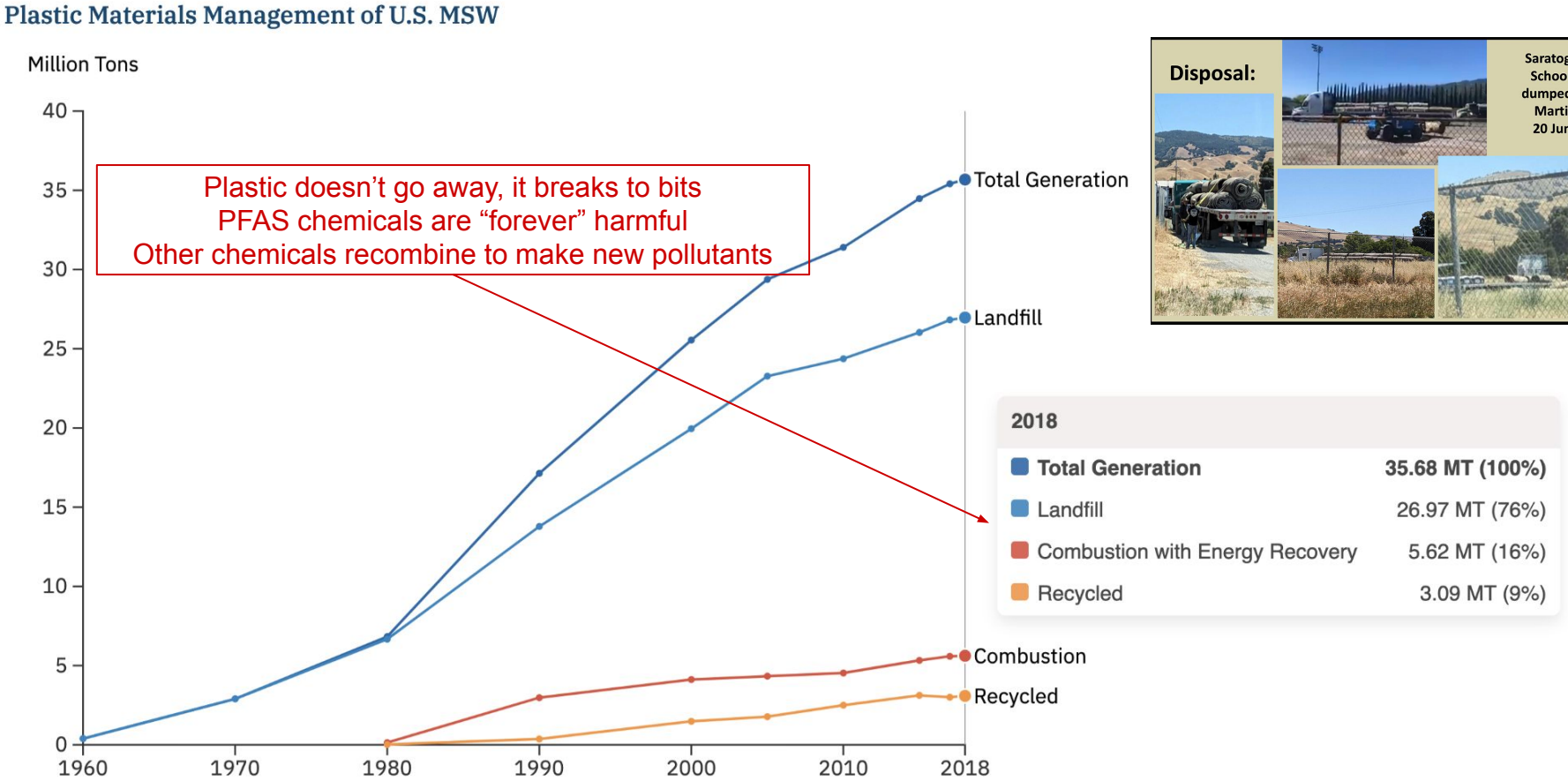
1. Manufacturing Defects. FieldTurf warrants that at the time of original purchase, the product will be free of any defects in materials and workmanship. Synthetic grass products are subject to normal wear and tear. Normal wear and tear is not a manufacturer's defect and is not covered by this limited warranty.

2. Pile Retention. FieldTurf warrants that the Product will retain at least 50% of its pile fiber under the following conditions:
   a. When properly installed to manufacturers acceptable standards, for normal use by a reputable contractor; and
   b. When product is properly maintained according to all manufacturer's care and maintenance guidelines.

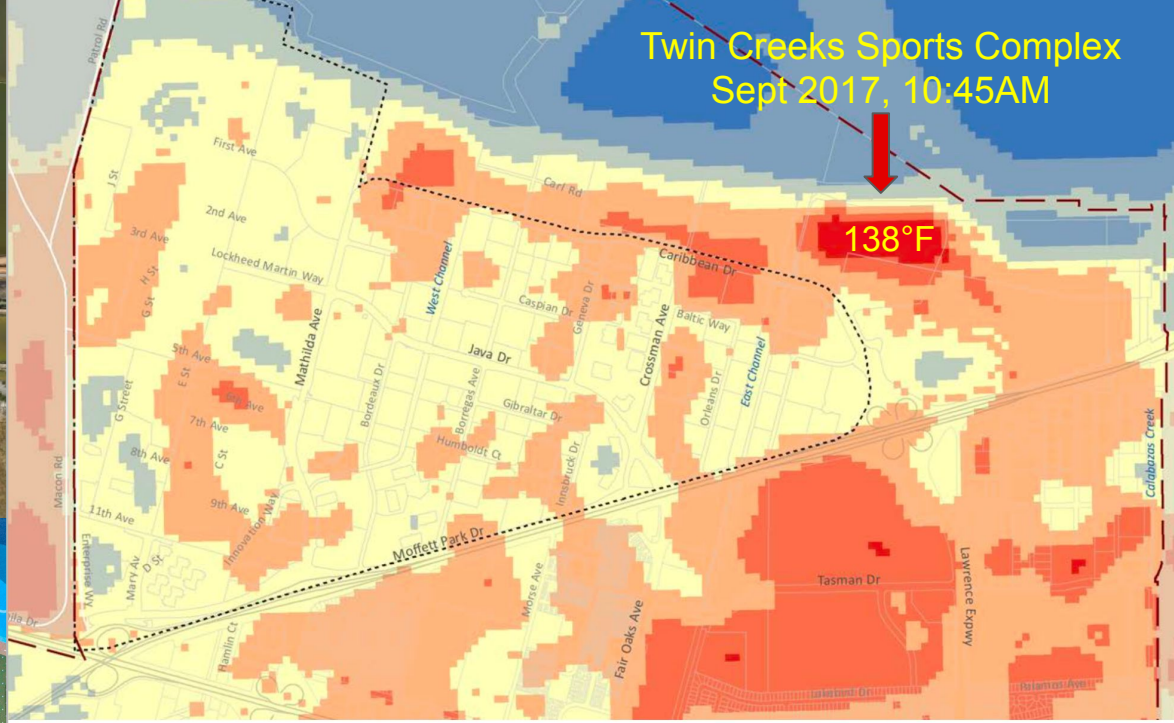
BEST IN THE INDUSTRY
8 YEAR
NON-PRORATED

Sales reps often say blades and infill stay put, but the manufacturing warranty says otherwise

Plastic By Year in the United States



Center for Sustainable Systems, University of Michigan. 2024. "Plastic Waste Factsheet." Pub. No. CSS22-11



Surface Temperature (°F)

- 73 -81
- 73 - 90
- 90 - 99
- 99 - 102
- 102 - 108
- 108 - 111
- 111 - 138

MPSP Boundary

N

0.5 mi

Urban Heat Island Effect

Moffett Park's landscape is highly vulnerable to the formation of urban heat islands. Extensive impervious areas, lack of vegetative cover, and low albedo surfaces exacerbate heat stress during summer and extreme heat events. This is of particular concern given Cal-Adapt's climate projections. Average summer temperatures are expected to increase in Santa Clara County by ~4°F by 2050 and up to more than 6°F by 2100

URBAN HEAT ISLAND

"Urban heat stress poses a major risk to public health."

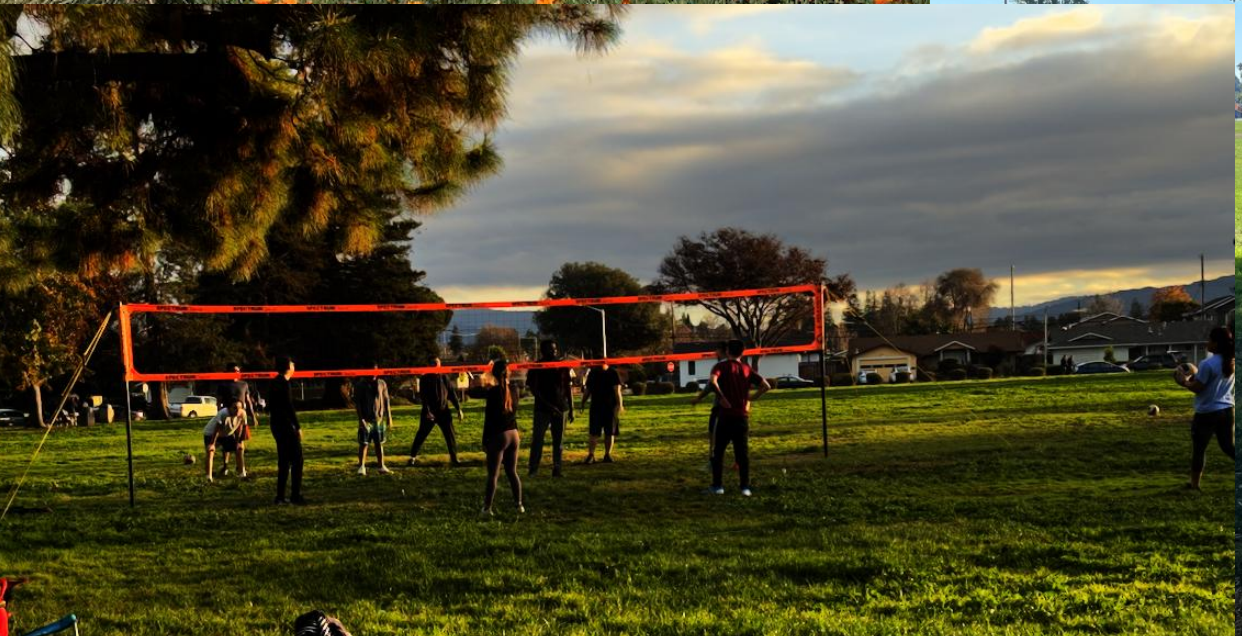
Hsu, A., Sheriff, G., Chakraborty, T. *et al.* Disproportionate exposure to urban heat island intensity across major US cities. *Nat Commun* **12**, 2721 (2021). https://doi.org/10.1038/s41467-021-22799-5

Fair Oaks Park, July 10, 2024, in Sunnyvale,
Artificial turf field with plant-based infill installed 2021

- Artificial turf at Fair Oaks at 151.5℉ was 60℉ hotter than grass
- "Maximum surface temperatures [of modern AT fields] during hot, sunny conditions averaged from **140°F to 170°F**."[1]
- Anti-scald burn chart states that, at **140°F**, skin exposed directly produces a 2nd degree burn in 3 seconds .[2]

1) https://www.nrpa.org/parks-recreation-magazine/2019/may/synthetic-sports-fields-and-the-heat-island-effect/
2) https://antiscald.com/index.php?route=information/information&information_id=15

Is there a viable alternative?
YES.



Lakewood Park

California Native & Drought Tolerant Landscaping

Hollyleaf Cherry Trees, Hummingbird sage, Ceanothus, etc.

Bentgrass

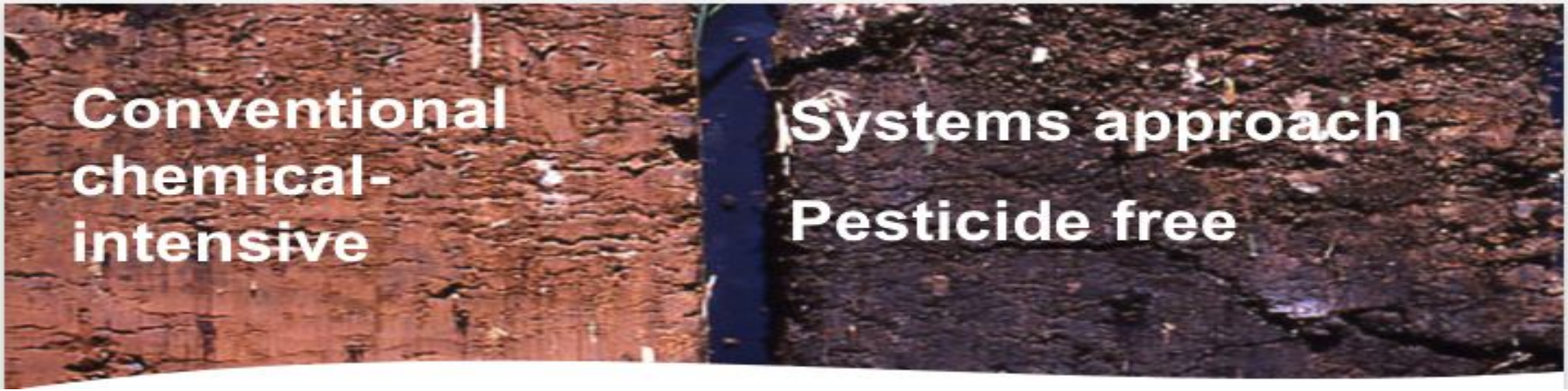
See what's possible
https://gngt.org/GNGT/Gardens.php?year=2023
https://Calscape.org

Drought Tolerant Grass Bred for Western Sports Fields

Toxic Use Reduction Institute (TURI)
Case Studies
UMass Lowell in Boston

Use reclaimed water, sustainable methods without synthetic pesticides, fertilizers, herbicides

Comparing Natural Grass



- Compaction
- Poor drainage
- Low soil quality
- Stress - chemicals

- Aeration
- Soil absorbs, retains water
- High soil quality
- Feed soil activity
- Grass thrives

Systems approach: pesticide free natural grass: 2,210 hours

In Marblehead, MA

Village School Fields: 2,210 hours

Youth and high school soccer, lacrosse

Hopkins athletic field: 1,860 hours

Hopkins Field, a full-sized football field

https://www.turi.org/publications/organic-grass-playing-fields/

Why not avoid large CAPEX and direct savings to OPEX?

If we invested $10 million over 10 years, the money could:

Install **7-10 new synthetic fields** that will need replacement in 8-10 yr

OR Renovate and properly maintain **30-35 natural grass fields**

The Precautionary Principle

- Take preventative action in the face of uncertainty
- Shift the burden of proof to proponents of an activity
- Explore a wide range of alternatives to possible harmful actions
- Increase public participation in decision making.

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1240435/

Time for questions