

Tel Aviv, May 24, 2017
Workshop on Marine Offshore Biorefinery in Israel



Introduction on offshore marine aquaculture planning efforts in Israel

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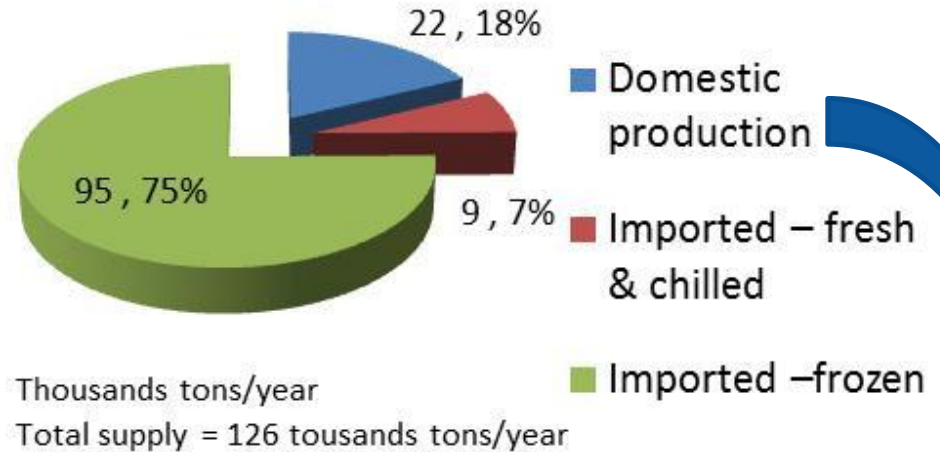


Aquaculture status in Israel

- Domestic production = 22% of total fish supply.
- Most of domestic production of fish is of Fresh water aquaculture.
- Future expansion is expected to be in marine aquaculture

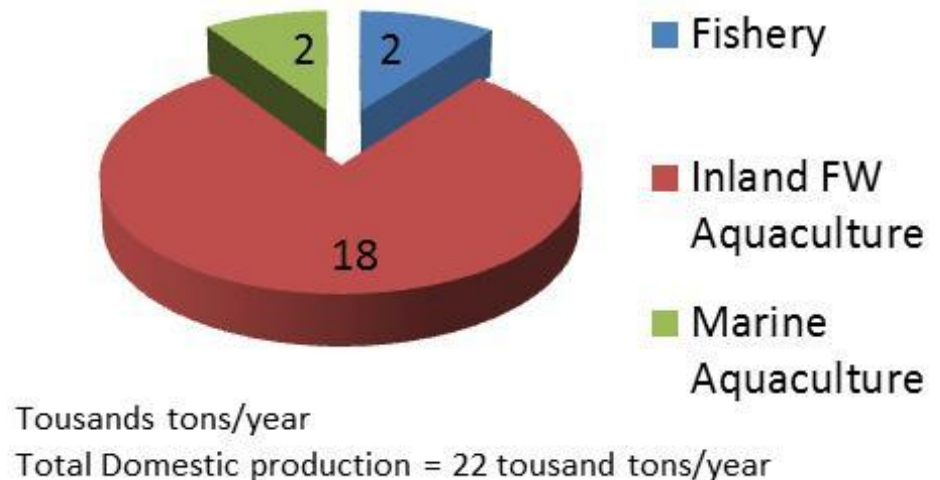
Sources of fish supply in Israel

(average of 10 years 2001-12)

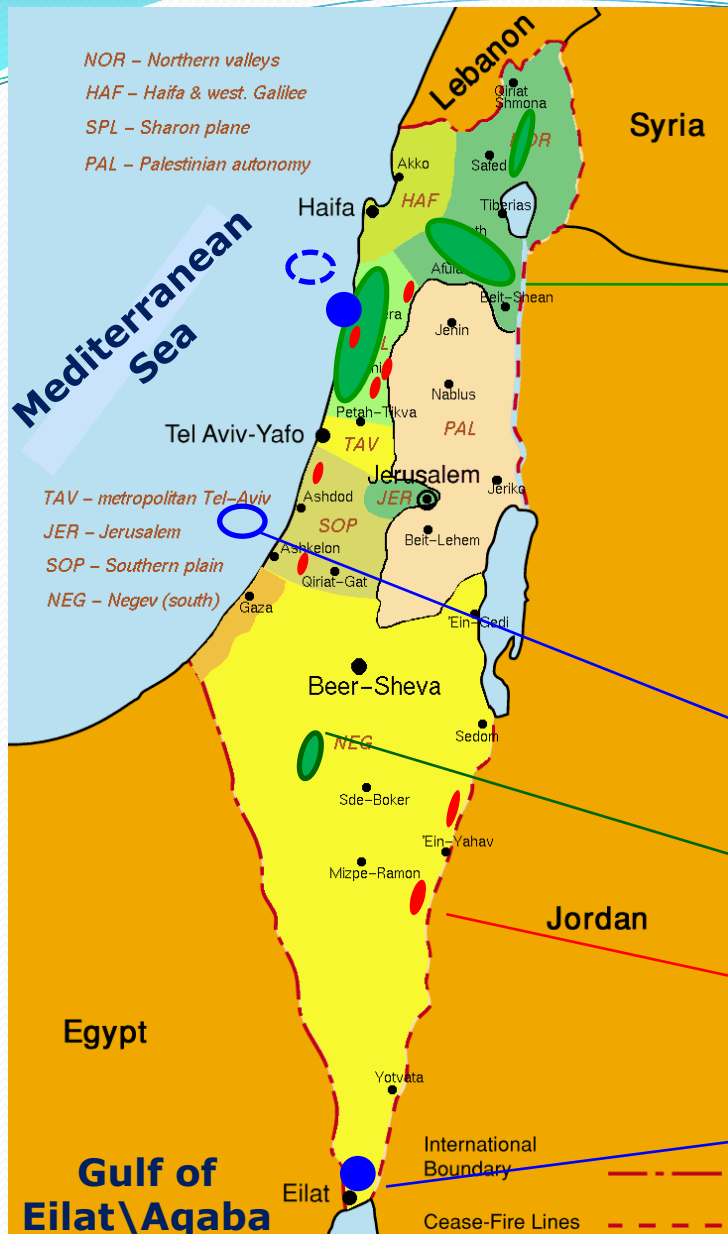


Domestic production of fish in Israel

(average of 10 years 2001-12)



Fish Culture in Israel

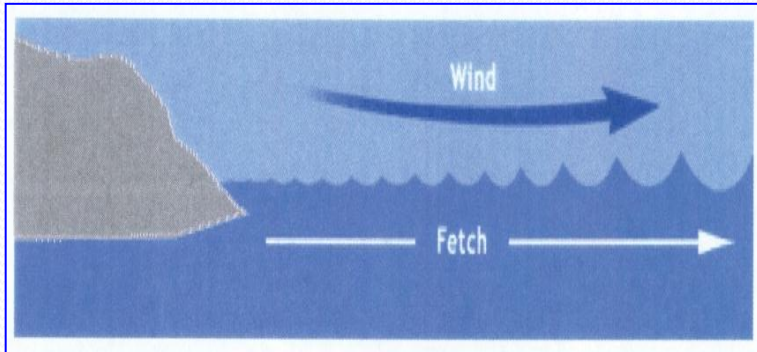


- Cage culture in the Mediterranean Sea
- Brackish water – Desert Aquaculture
- Ornamental fish farms
- Marine Hatchery and land based pilot

Main area for aquaculture future development: Mediterranean open sea

Marine conditions at the Israeli MED coast

Long wind fetch



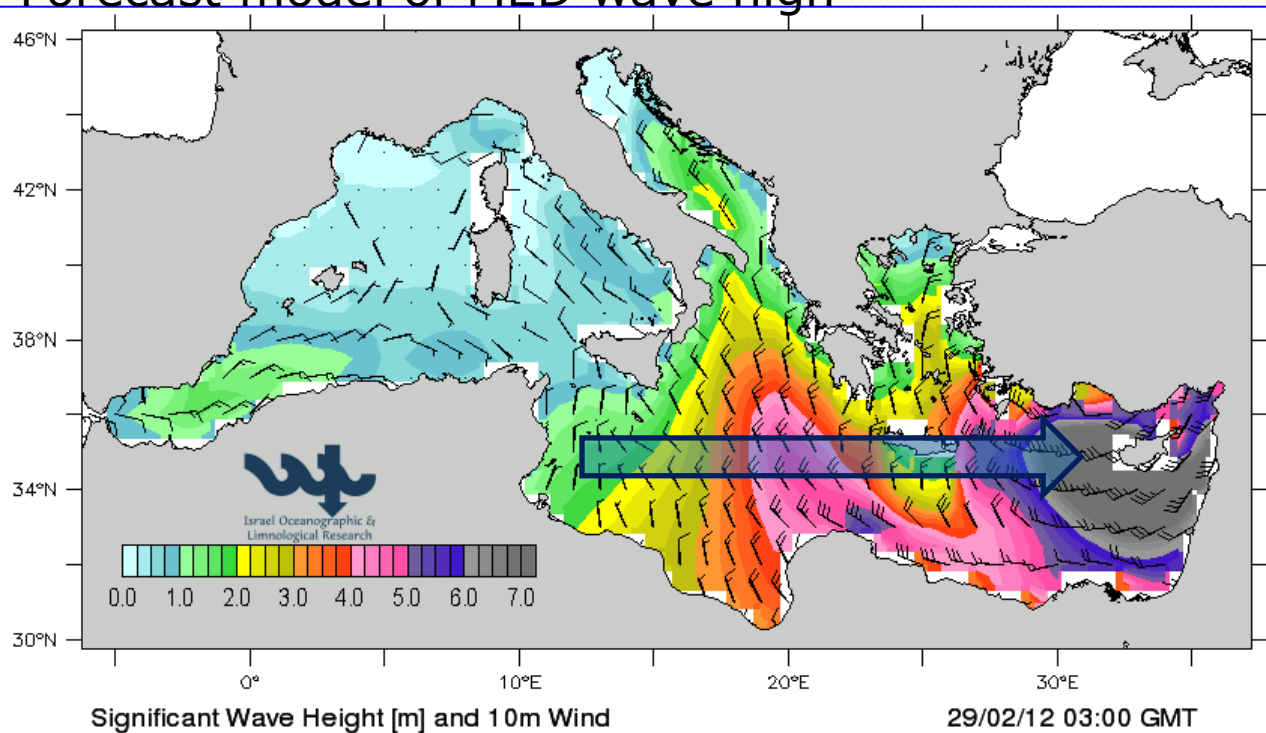
Sea conditions:

- Wave significant height = 7- 8 m
- Wave maximal height = 12 – 13 m

Location of cages

Water depth of 30-80m for submersible cages to avoid high waves during storms

Forecast model of MED wave high





איור 15, אזורים מורפולוגיים עיקריים במזרח ים הלבנט (National Geographic, 1982)

Mild slope of continental shelf

גבול המים הטריטוריאליים

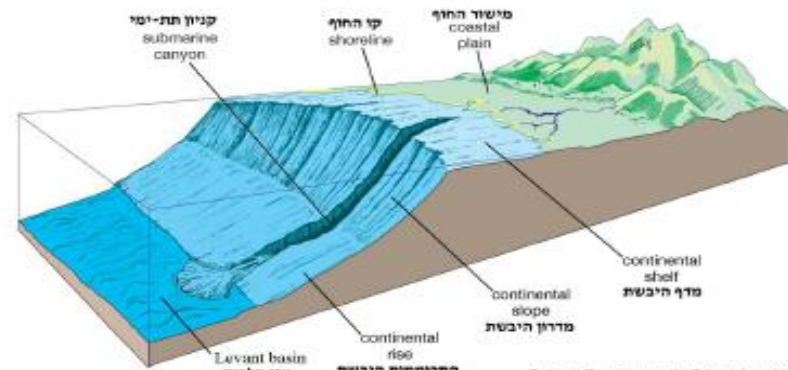


מתוך "אביב ניהול" 7/07 איים מלאכותיים

Cage location in the open sea

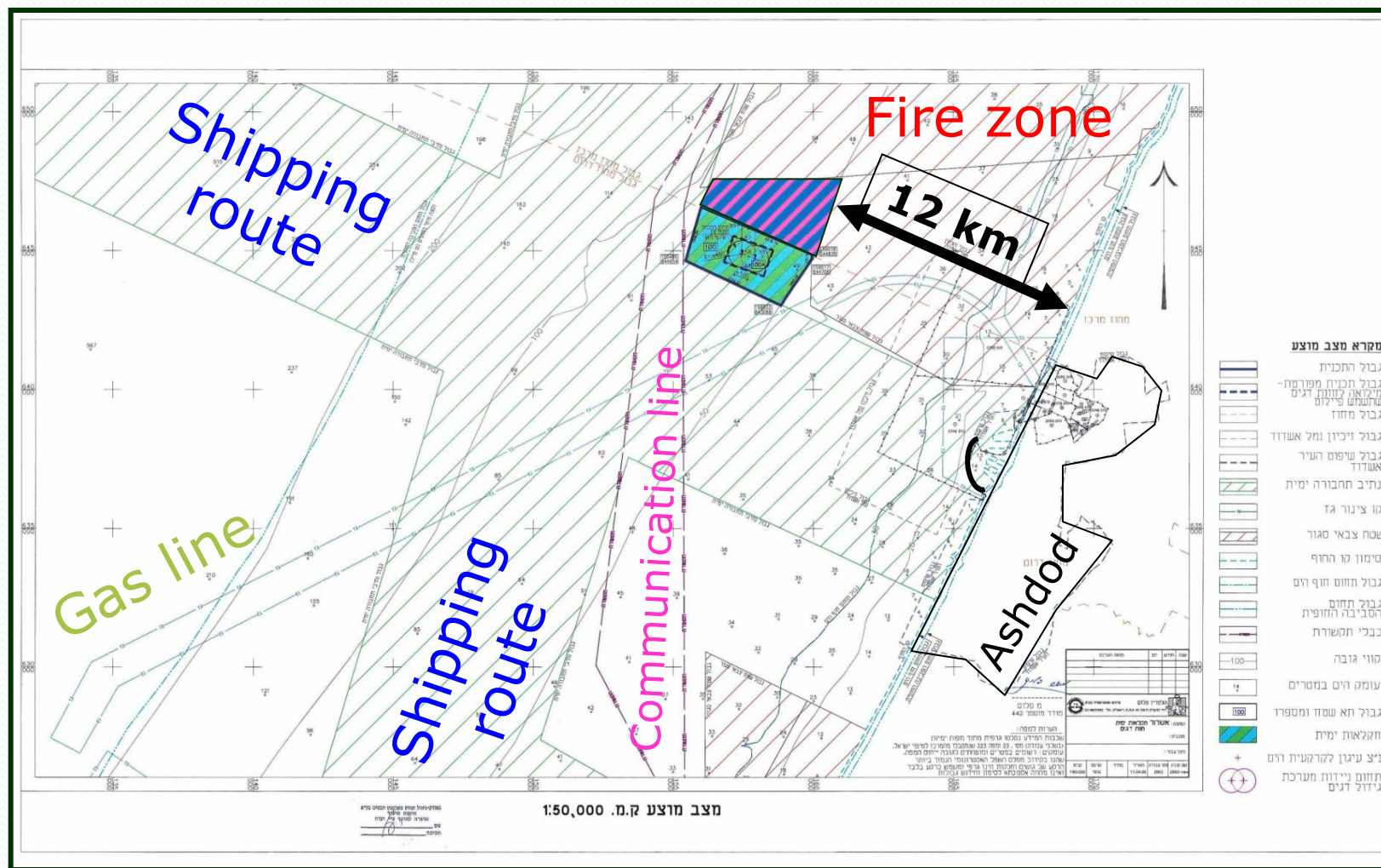
At mild slope the depth of 20 to 80m is at:

distance of 5 – 20 km offshore



איור סכמטי (ללא קנה מידה) של תופעות ואזורים מורפולוגיים עיקריים במרחב הימי של ישראל © 2013 Encyclopedia Britannica, Inc.

Location of present off shore cage farms Ashdod site (14 km²)



Policy recommendation for future Development of Mariculture in Israel

Sustainable development of
marine aquaculture in the
open sea of the Israeli
Mediterranean off-shore coast

Neaman Institute – Technion, Haifa
July 2015

**פיתוח בר-קיימא של חקלאות ימית
ביום התיכון של ישראל**



דו"ח מסכם
יולי 2015
כתבו וערכו:

מוסד המחקר מדיניות האומות
למחקר מדיניות האומות

פרופ' אופירה אילון
ד"ר תמי טרופ
ד"ר ציפי עשת
עידן ליבס
מעין זרביב
אפרת כרם

ייעוץ אקולוגיה ימית - ד"ר דן צ'רנוב, מיכל גרוסוביץ, אוניברסיטת חיפה
ייעוץ חקלאות ימית - פרופ' עמוס טנדלר, מלח"י, אילת
מיפוי- דן רוט, הטכניון

Main outputs



- Recommendations for policy objectives, strategy and long-term planning tools, spatial layout development and sustainable interface of aquaculture in the Mediterranean Sea in Israel.
- Mapping of the location desirable areas in the Mediterranean aquaculture Israel and logistic support sites on the coast, considering the plans, needs and intentions of other parties in these spaces.

Fish species

Future species

Sea bream

(Sparus aurata)



Species under R&D process

(mainly for land base culture)

Mullet

(Mugil Cepalus)



© NIWA

White grouper

Epinephelus aeneus



12/01/2008

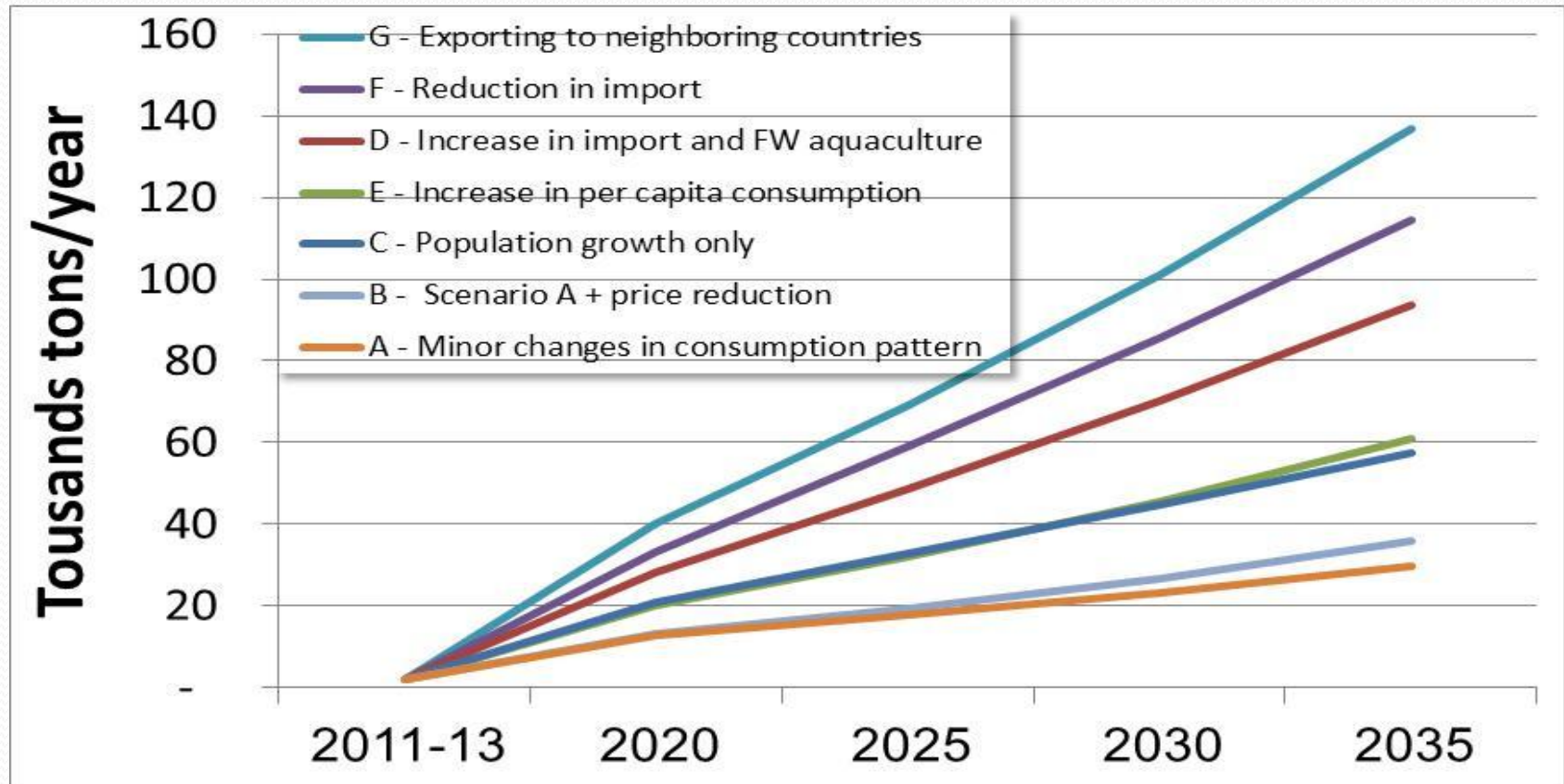


Future species

Blue fin Tuna



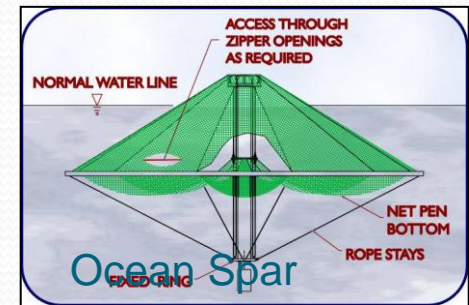
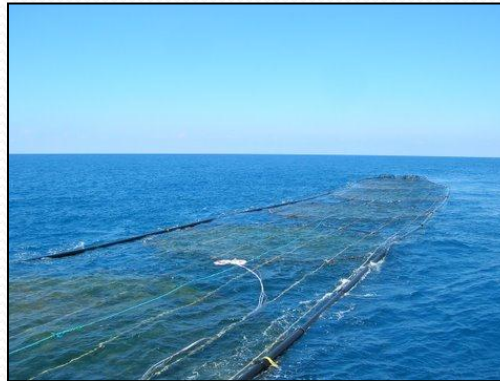
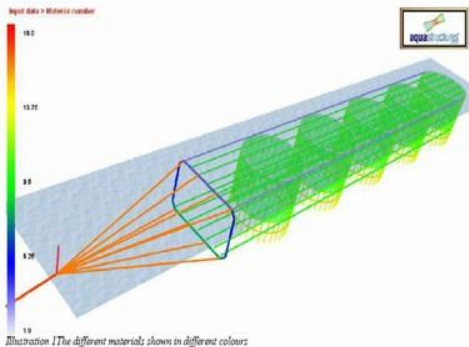
Israeli mariculture additional production forecast at different scenarios



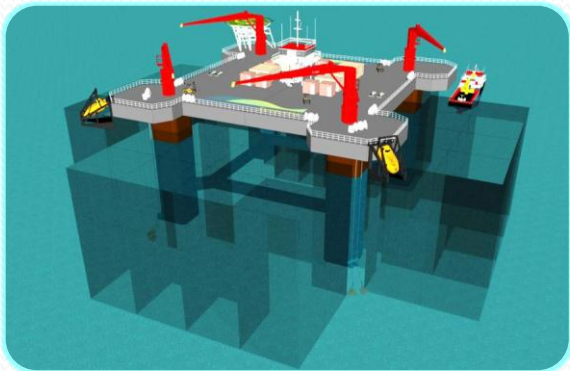
- Future potential development based on various scenarios of demand
- An estimated production target for 2035 is **100,000 ton/year**

Off shore cage technologies in Israel

Other technologies



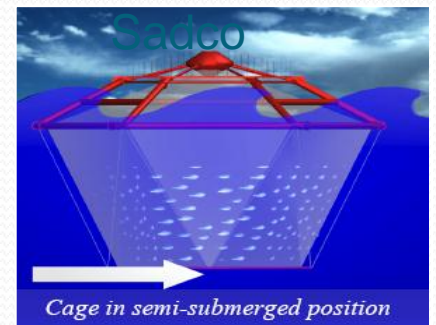
SubFlex – developed in Israel
Operating 8 years in Ashdod off shore site



Off shore rag – Developed in Israel



TLC - tested and improved in Israel



Range of production per unit area: 0.4 – 8 thousand tons/km²

Typical production: **1 thousand tons/km²**

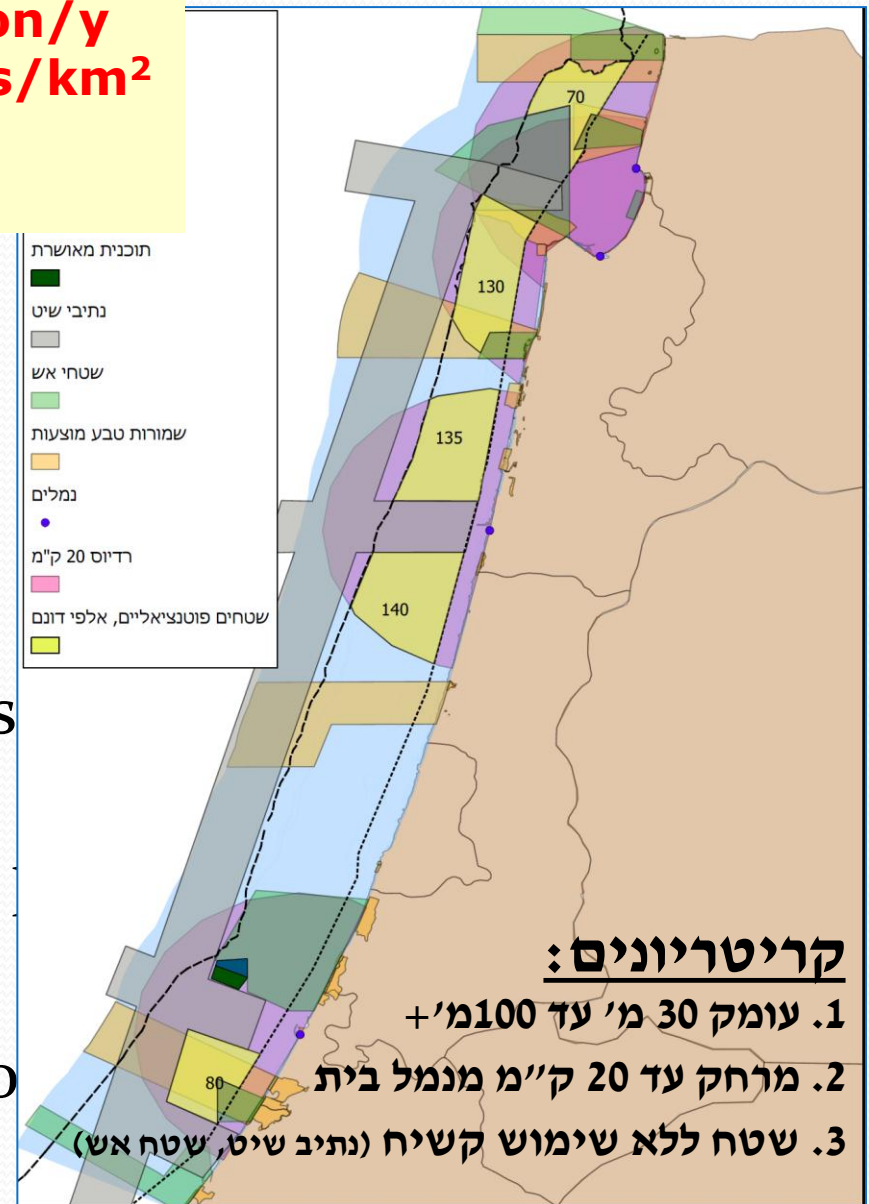
Area requirement

- Future production = **100 thousand ton/y**
- Typical production = **1 thousand tons/km²**
- **Area requirement = 100 km²**

Search areas

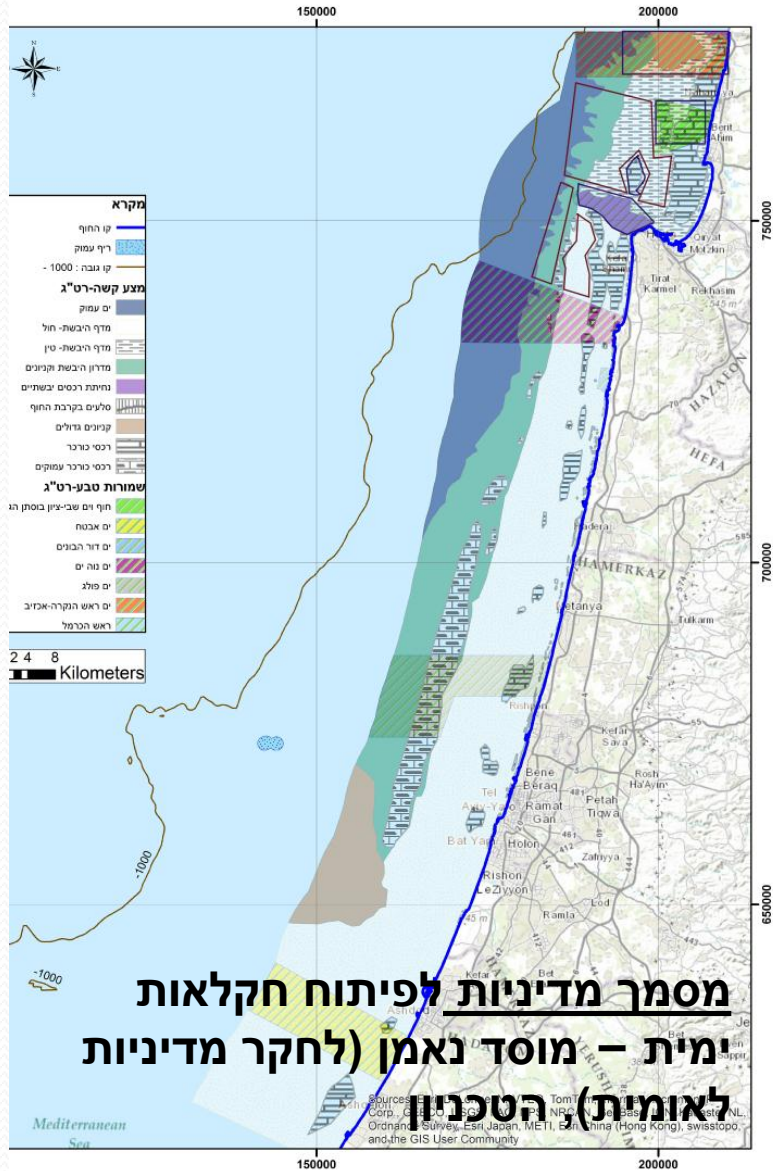
Search criteria

- Available areas (excluding shipping routes, military zones nature reserves).
- Distance of up to 20 km from operational base.
- Water depth between 30 – 100



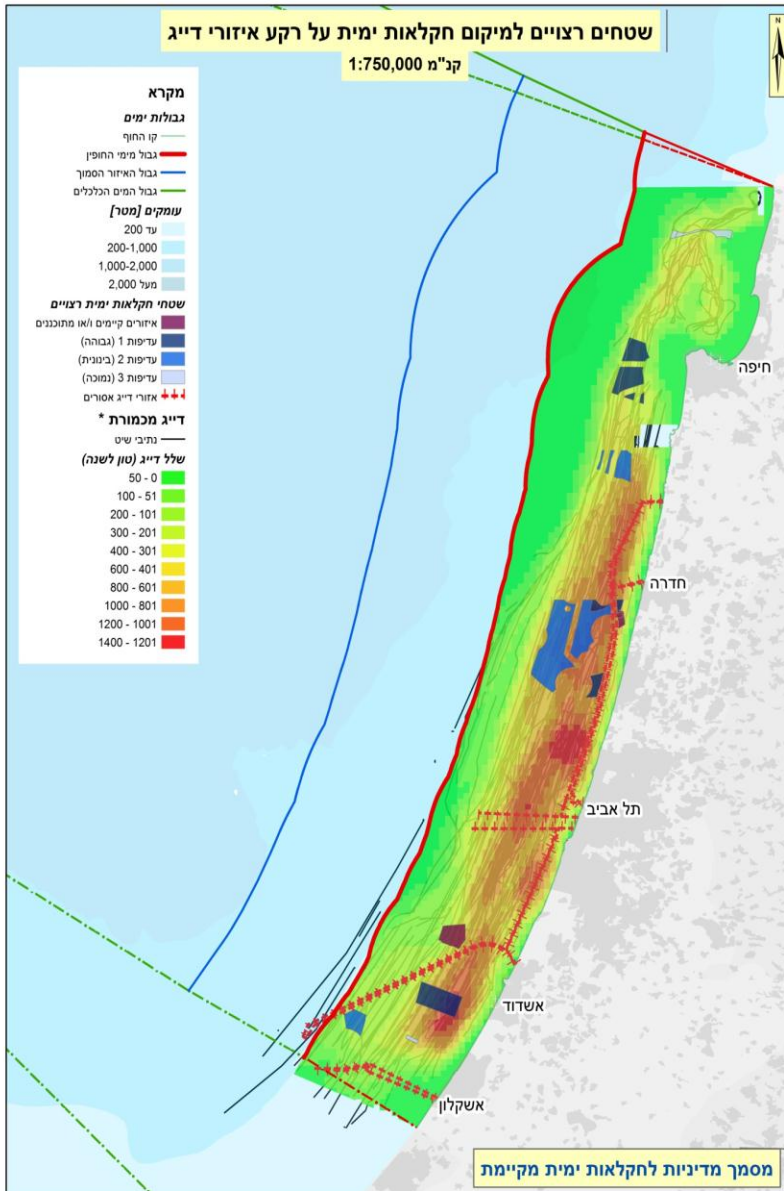
Ecological consideration

Gas and oil drilling

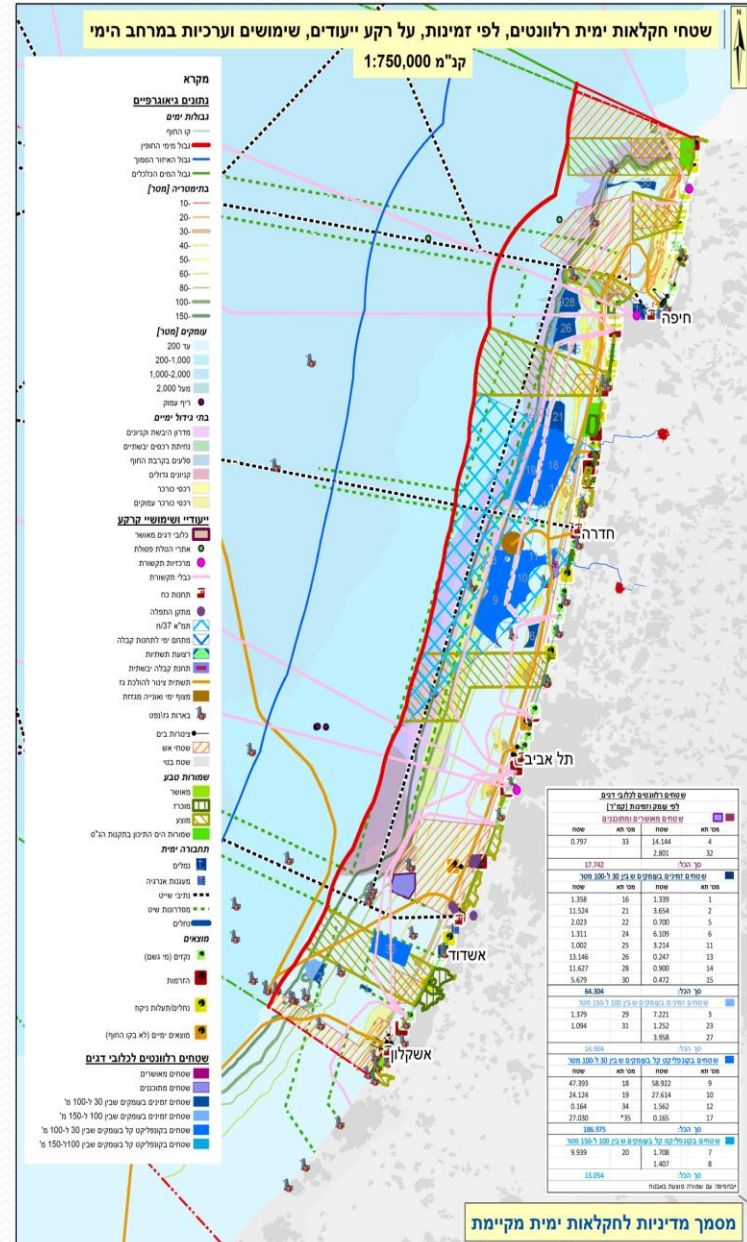


Fishing route

Initial results



*מקור הנתונים: מסמך מדיניות למרחב הימי של ישראל - ים תיכון



200 km² were identified

Evaluation of aquaculture

needs on a national perspective

Israel Marine Area plan

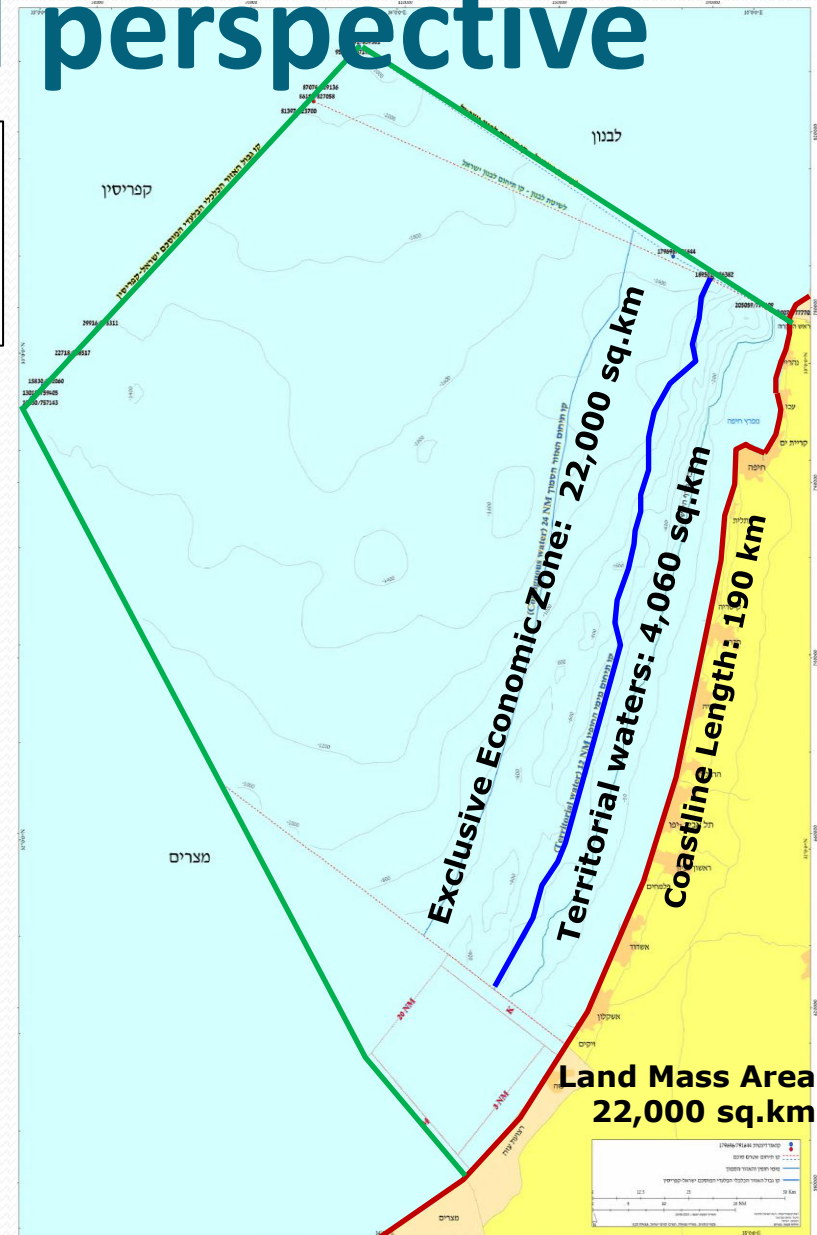
Land Mass Area: **22,000 sq.km**

Coastline Length: **190 km**

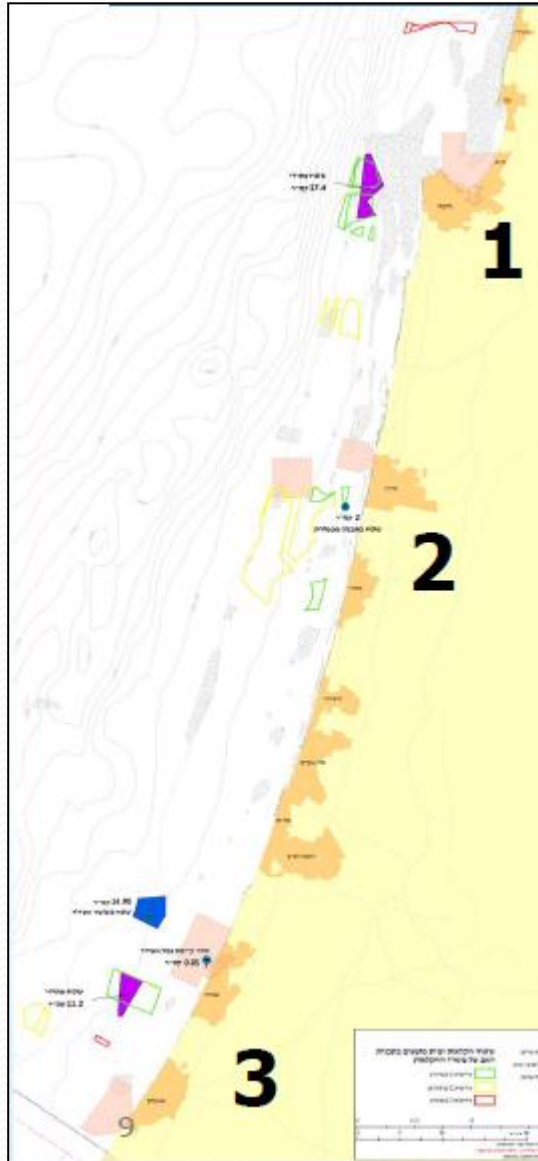
Territorial Waters: **4,060 sq.km**

Exclusive Economic Zone: **22,000 sq.km**

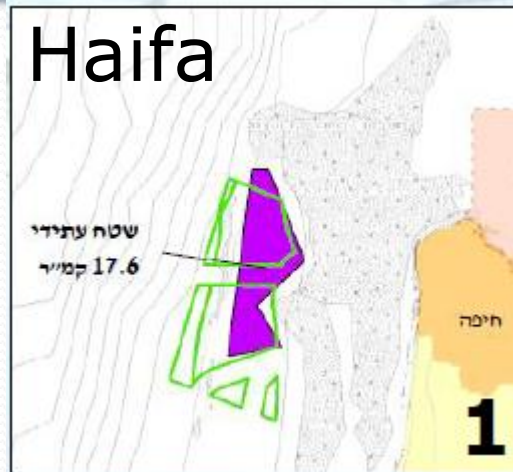
Total Marine Area : **26,000 sq.km**



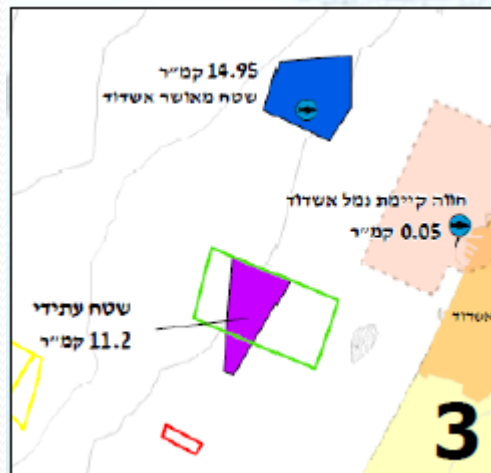
Future development of marine areas



Haifa



Ashdod



Hadera



Total area approved for first phase = 46 km²

Sites of Mariculture and algae in Israel

production, R&D and future activity



In collaboration with
Prime Minister office

Deep Sea future site:

Conceptual plan for large scale areas
for culture of marine algae for fuel.

Education and R&D site - Michmoret

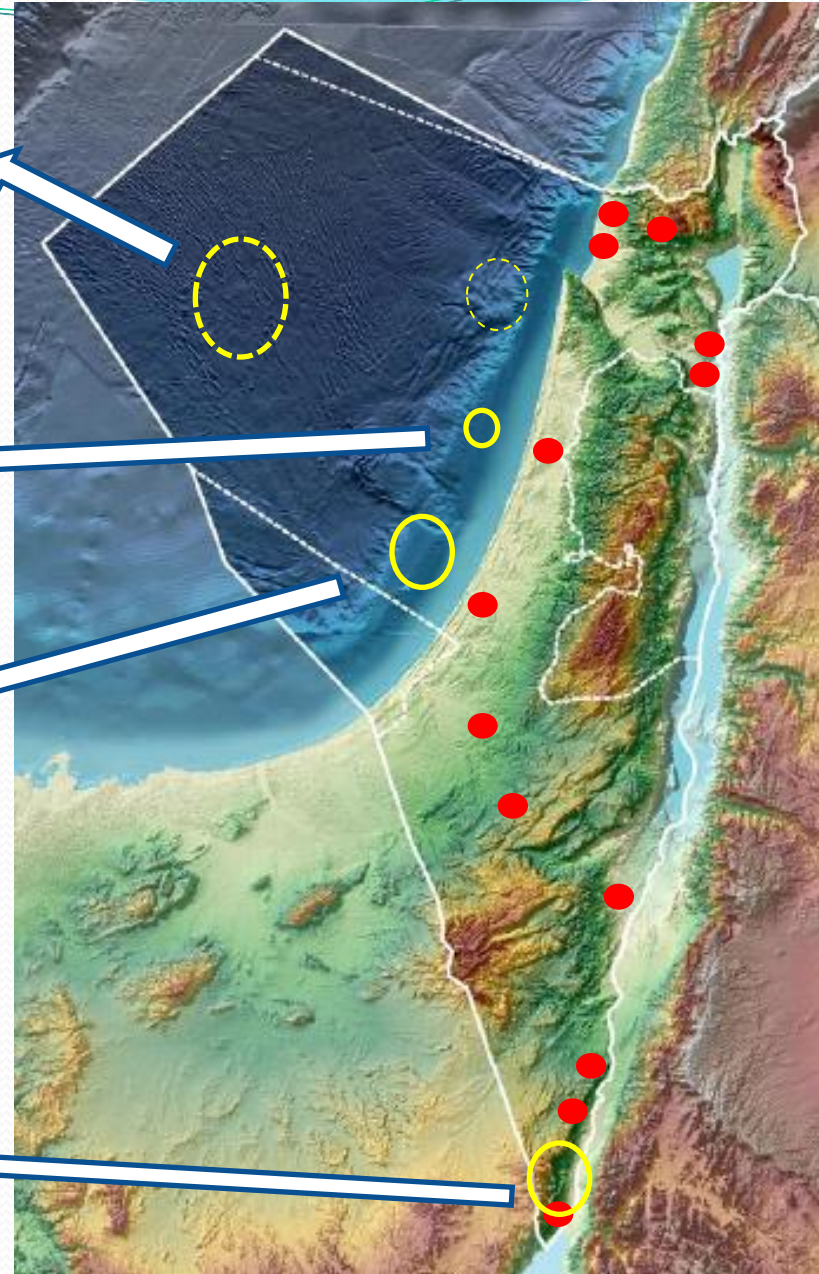
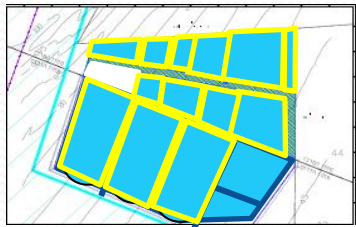
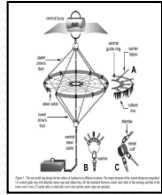
90 hectares , 3 km off shore.

Ashdod poligon

Commercial site, 1,400 hectares, 12
km off shore, including 25 hectares
for R&D.

Mariculture park in Southern Arava

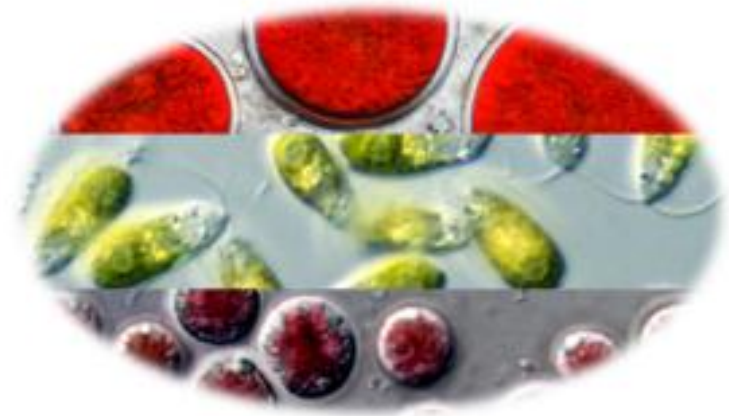
120 hectares , 4-8 km in land, 1,000 m³/h of sea
water, agreements with environmental regulations.



Algae culture in Israel - survey

- 16 companies (2016)
- 200 employees
- Farm area 230 dunam
- Expected income 180 million NIS
- Several limitations were identified.
- A semi-commercial scale bio refinery for extracting valuable compounds was marked

ענף האצות - מנוע צמיחה ירוק לחקלאות הישראלית



ד"ר עדי לוי

עמית ממשק | יועץ מדעי

אגף לדיג ולחקלאות מים, משרד החקלאות ופיתוח הכפר

אינג' נעם מוזס

ראש תחום חקלאות ימית

אגף לדיג וחקלאות מים, משרד החקלאות ופיתוח הכפר

דצמבר 2016

Thank you for your attention



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development,**

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Requirements for land operational base

Land operational bases are needed for:

- Fish loading
- Equipment and feed transfer
- Crow transportation

