

Seedcorn Project DP409 'Future food from water:

DP409B – 'Integrating Aquaculture and Fisheries into a more holistic food production chain'

ACIG 30.4.19

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Centre for Environment
Fisheries & Aquaculture
Science



Cefas

DP409B: 'Integrating fisheries and aquaculture into a more holistic seafood production system.'

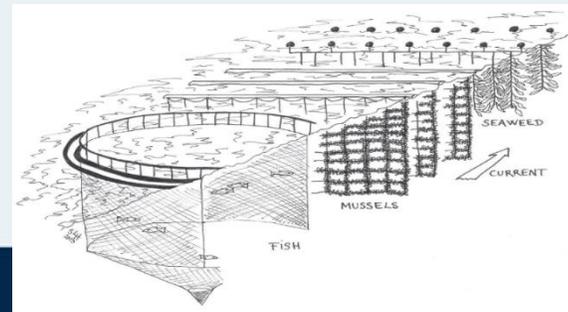
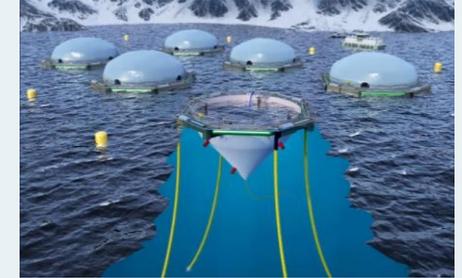
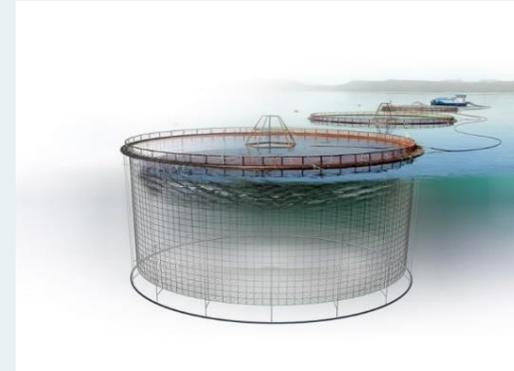
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Year 1:

- Literature review on potential barriers/chances
- Case studies (grey literature/word of mouth)
 1. Switched from fishing into aquaculture
 2. Combined fishery activities with aquaculture.
 3. Used aquaculture technology for their benefit within the capture fishery area

Year 2:

- Workshop with fishermen to elicit their believes



Motivation

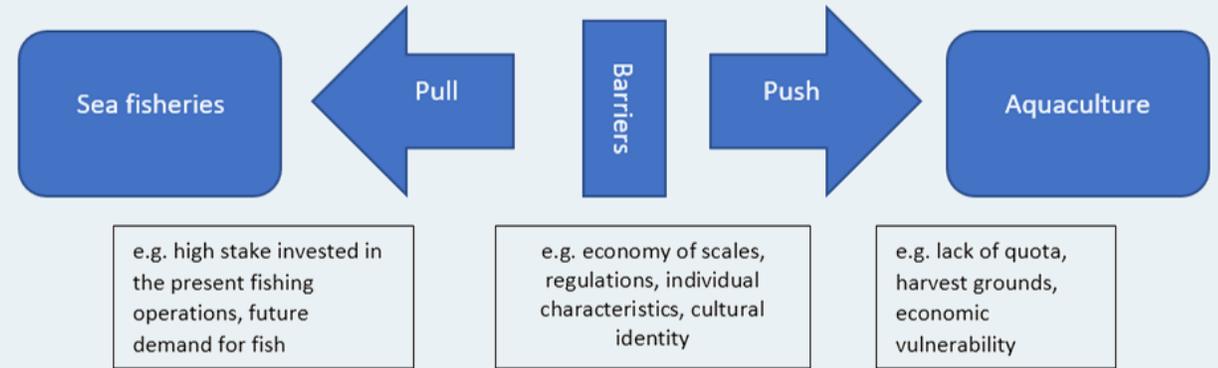
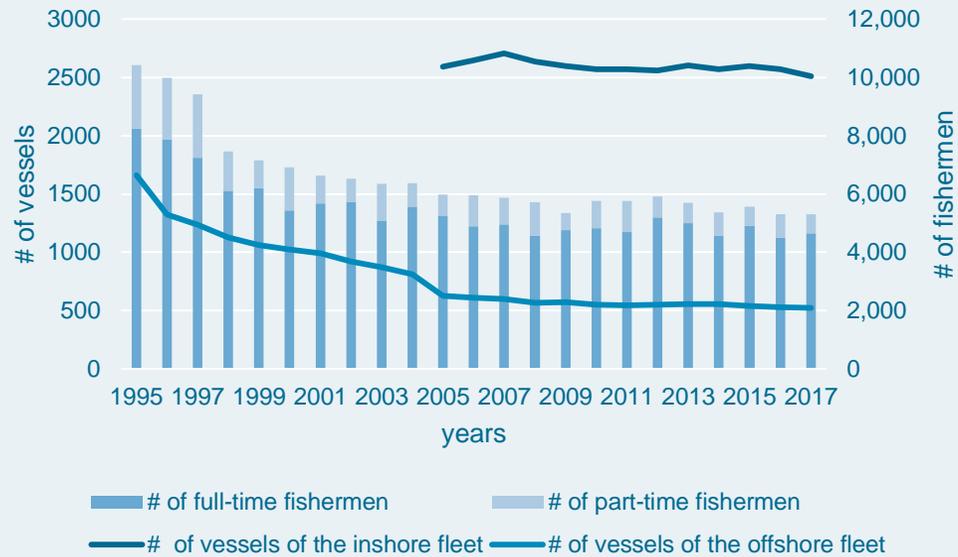


Figure 2. Push and Pull factors to diversify from fisheries into aquaculture

Method – 1st year

Janet Brown

ASSG – The Grower

Your ref: DP409B
Our ref: 12 Sep 2017

Dear Janet

Integration

Cefas are currently and the potential for literature search the appropriate the

To supplement the may already be takl good examples whe permissions. The fc

We would be very g (If documented proj

Table 1: → UK examples of fishermen transferring into aquaculture.

Successful	Location
Diversification from fishing into aquaculture of Lumpfish for supply to the Scottish salmon farming industry for biological control of seal-lice.	Dorset
A fisherman who diversified into Oyster production in Poole harbor - the largest Pacific oyster farmer in England.	Dorset
Some workers on a small-scale rope-grown Mussel farm that has into growing Scallops are ex-commercial fishermen.	
A person moved to the area to become a fisherman but later becoming a Mussel farmer. Information available in a past edit Grower magazine. (link?)	
A person moved to the area to become a fisherman but later becoming an Oyster farmer. Information available in a past edit Grower magazine. (link?) →	
Lobster fishermen and others were early pioneers of the Salmon Scotland several decades ago. Economies of scale now prevent fi new salmon farms but employment opportunities for fishermen: good.	
Fishermen began drifting over to Mussel farming (until recent started doing much better).	
Started life as fishermen then went into processing and aquacult oysters although they may have now sold their oyster farm.	

http://www.seafish.org/media/1625058/seafish_ni_case_studies_henning_brothers_lr.pdf

Could the English inshore fishery fleet integrate with aquaculture into a more holistic seafood production system?

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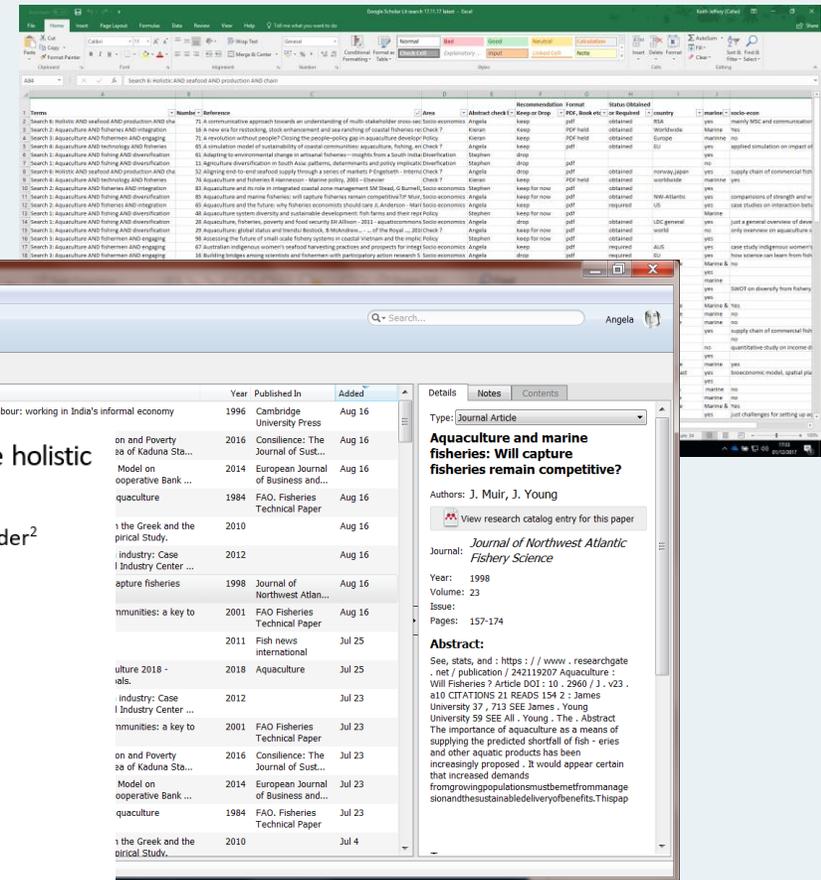
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Keywords: inshore fishing fleet, income diversification, aquaculture

Abstract: tbc

1. Introduction

Patterns of continuing population and consumption growth means that global demand for food will increase for at least another 40 years and a multifaceted and linked global strategy is needed to ensure sustainable and equitable food security (Godfray *et al.*, 2010). The Sustainable Development Goals (SDGs) agenda makes achieving food security and ending malnutrition a global priority. It has been argued that within this framework, the importance



Desk Based Literature Research Findings – 1st year (Emerging themes)

- Economy of scale

- Salmon farms in Norway started as small-scale operations. Advances of production and marketing gained from technological advances led to economies of scale featured in some of the processes (Vergos et al., 2010).
 - Relatively large companies (e.g. Marine Harvest, Scotland) emerged early (Svansson, 2012).
 - Since 1993, aquaculture production has increased in Greece and Norway, while employment has declined due to falling prices for aquaculture products – as a result, small-scale farmers are finding it harder to survive (McCausland et al., 2006).
- Aquaculture ventures nowadays need to start big in order to be able to compete with existing farms

- Complementary with marine livelihoods?

- Restricted financial capacity combined with long production cycle of the fish (Pomeroy, Parks and Balboa, 2006, Godfray et al., 2010)
- Availability of land/sea space? (FAO, 1984; Muir and Young, 1998)



Desk Based Literature Research Findings – 1st year (Emerging themes)

- Social acceptance

- In the United States, opposition to marine aquaculture by local and national interest groups and local, state, tribal, or national policies have restricted the marine aquaculture to a size much less than its capability (Knapp and Rubino, 2016)

- Individual skills

- Age, education, skills and experience may hugely impact the success of business diversification and, indeed, the reasons for its initiation in the first place (Kelly and Ilbery, 1995)
- Backgrounds in business, science, and practical on-the-water skills are all useful in starting an aquaculture operation while personality traits were more of a motivating factor (Love, 2016).
- Members of the small-scale fishing community generally have a deep-rooted sense of pride in their occupational identity and a responding loyalty to the fishing way of life. (McGoodwin, 2001).



Grey Literature: Examples of where fishermen transferred directly to aquaculture



Diversification from fishing into aquaculture of **Lumpfish** for supply to the Scottish salmon farming industry for biological control of seal-lice (Dorset).

A fisherman who diversified into **Oyster** production in Poole harbour who is now the largest pacific oyster farmer in England.



A career switch from wild capture to **on-growing turbot** to a market size due to changing economic, regulatory and lifestyle concerns and reduced fishing opportunities (a small operation that was also a tourist attraction)



Examples of Fishermen combining fishery activities with aquaculture

Small scale **mussel** lays - product sold at premium prices to local markets. Seed from Wash or local beds. The fishermen also fish for crabs, lobsters and whelks. (**Waddleton Regulating Order**, Devon).

A company that has diversified from owning fishing boats and processing wild seafood to also farming oysters.

http://www.seafish.org/media/1625070/seafish_ni_case_studies_-_rooney_fish_lr.pdf

Hatcheries for Lobsters that use wild captured berried lobsters for aquaculture (supplied by fishermen) before hatching, rearing / on-growing and release back to wild to supplement stocks.



Fishermen using aquaculture technology for their benefit within the capture fishery area

A fishery for live Nephrops that are kept alive with aquaculture technology and sold live. Good sustainability as returns survive

Crustacean fishermen on shore holding tanks with full recirculation and aeration for holding Lobsters to manage supply and demand.

Capture based aquaculture (CBA)

«A time to live, a time to die»

What is CBA ?
20 % of marine aquaculture production

The capture of wild aquatic organisms, juveniles or adults in order to increase their value through aquaculture techniques

Fishing is hunting!
Aquaculture is farming!
CBA is hunting and farming!

Nofima

80 % dead before process

95 % survival

+ 2 NOK ?

Pink belly and loins

White as cod from long-line



Year 2

Workshop with fishermen – Q-method



Method: The Q-methodology

- Quantitative approach to analyse person's viewpoint on a specific topic
- Respondents are asked to 'sort' (i.e. organise) statements provided according to the extent to which they **agree** or **disagree** with those statements.
- Q analysis is conducted to reveal factors (i.e. clusters) of opinions. These can be interpreted as viewpoints or discourses that exist in relation to our topic.
- No need for a large sample (usually around 20 – 40 participants).



Generating the Q-set

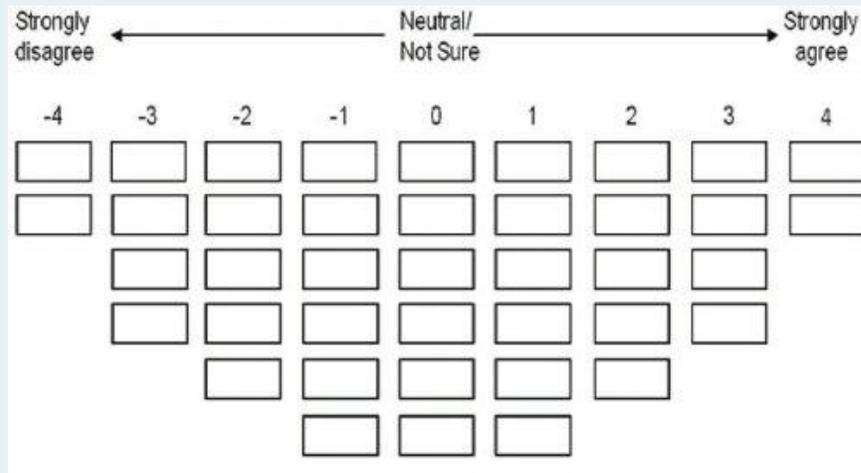
Defined Research Question: What are the socio-economic barriers for the UK under 10m fishery fleet to integrate with aquaculture?

- The statements used in this study were taken from the **literature review and interviews** – e.g. “I like the buzz of fishing”
- There were 30 **BALANCED** final statements that covered the full range of opinion on the barriers to integration into aquaculture.
- Grouped statements into five themes:
 - Social,
 - Economic,
 - Training/skills,
 - Regulatory/policy,
 - Environmental

Statement number	Statements	Category
1	I am too old to think about other career opportunities.	Social
2	Aquaculture will become more important to meet increasing global demand for fish.	Social
3	In terms of lifestyle, there would be little difference between aquaculture and fishing.	Social
4	I enjoy the 'buzz' of fishing.	Social
5	I tried some aquaculture in the past and it did not work out.	Social
6	I have no contacts in the aquaculture sector.	Social
7	Fishing is important to me because it's a family tradition.	Social
8	I have not heard any success stories about aquaculture.	Social
9	I am proud to be a fisherman.	Social
10	Aquaculture is for me a lone man's work.	Social
11	The public perception of aquaculture is not good.	Social
12	It would be easier to start an aquaculture business with some extra training/qualifications.	Training/skills
13	I do not know where to find information on rules and regulations involved in aquaculture.	Training/skills
14	My knowledge of fishing is relevant in aquaculture too.	Training/skills
15	The equipment I use for fishing could be easily used for aquaculture.	Training/skills
16	I would need financial support to get involved in aquaculture.	Economic
17	Start-up costs would be too high for me to get involved in aquaculture.	Economic
18	Having an additional aquaculture lease would provide greater flexibility with my business.	Economic
19	Aquaculture is not as profitable as fishing.	Economic
20	Already existing aquaculture businesses are too big for me to compete with.	Economic
21	Restaurants already sell farmed fish and shellfish, so I am confident a market exists that I could sell to.	Economic
22	I have enough downtime in winter to do some aquaculture.	Economic
23	Complying with all the paperwork/regulations involved in aquaculture is not an issue for me.	Regulatory/policy
24	Due to the lack of quota for key stocks, aquaculture is the long-term solution for the English in-shore fleet.	Regulatory/policy
25	There is too much environmental risk (disease, run off etc.) involved in aquaculture.	Environmental
26	Protecting any aquaculture stocks from thefts would be difficult.	Environmental
27	Aquaculture requires land-based facilities and space, which I see as a problem to keep secure.	Environmental
28	I am not aware of any appropriate aquaculture sites in the area I live.	Environmental
29	Lack of productive fishing grounds due to MCZs makes it worth-while to consider aquaculture.	Environmental
30	Aquaculture means not traveling as far as we have to do now to reach productive fishing grounds.	Environmental



Workshops/ Conducting the Q-sort



- Different workshops – Hastings, Mevagissey, Kingsbridge and Bridlington (no show)
- 25 fishermen contacted through different IFCAs
- **Hastings** – sole, plaice, skate, cod, bass
- **Mevagissey** - mackerell, pollock, red mullet, mullet, bass, pilchards, bream, flatfish, herring
- **Kingsbridge** – shellfish
- Range of ages from 16 to over 65
- Different gear groups
- 30 statements sorted into distribution (shaped as a normal dist.) so that we could conduct **principal component analysis** (allowed us to identify common groupings of responses amongst the participants (that we call factors)).



Results: An Overview

- 4 Factors:
 - “Pro-Aquaculture”
 - Factor 2: “The Worrier”
 - Factor 4: “The Inexperienced”
 - “Contra-Aquaculture”
 - Factor 1: “The Traditional fisherman”
 - Factor 3: “The Thrill Seeker”



1. “Traditional Fisherman”

7. Fishing is important to me because it's a family tradition

9. I am proud to be a fisherman*
Significant to 10%

15. The equipment I use for fishing could be easily used for aquaculture.

24. Due to the lack of quota for key stocks, aquaculture is the long-term solution for the English in-shore fleet.

2. “The Worrier”

17. Start up costs would be too high for me to get involved in aquaculture.**

22. I have enough downtime in winter to do some aquaculture.**

5. I tried some aquaculture in the past and it did not work out.

15. The equipment I use for fishing could be easily used for aquaculture.

3. “The Thrill seeker”

4. I enjoy the 'buzz' of fishing.*

7. Fishing is important to me because it's a family tradition.*

5. I tried some aquaculture in the past and it did not work out.

15. The equipment I use for fishing could be easily used for aquaculture.

4. “The Inexperienced”

9. I am proud to be a fisherman.

12. It would be easier to start an aquaculture business with some extra training/qualifications.*

8. I have not heard any success stories about aquaculture.

17. Start up costs would be too high for me to get involved in aquaculture.



Factor 1: Traditional Fisherman - comparison with other factors

- **Statements ranked higher in Factor 1 than any other factor**
 - 5. I tried some aquaculture in the past and it did not work out.
- **Statements ranked lower in Factor 1 than any other factor**
 - 3. In terms of lifestyle, there would be little difference between aquaculture and fishing.
 - 10. Aquaculture is for me a lone man's work.

Factor 2: The Worrier - comparison with other factors

- **Statements ranked higher in Factor 2 array than any other factor**
 - 14. My knowledge of fishing is relevant in aquaculture too.*
 - 19. Aquaculture is not as profitable as fishing.
- **Statements ranked lower in Factor 1 than any other factor**
 - 26. I have enough downtime in winter to do some aquaculture.

Factor 3: The Thrill seeker - comparison with other factors

- **Statements ranked higher in Factor 3 than any other factor**
 - 8. I have not heard any success stories about aquaculture.
- **Statements ranked lower in Factor 3 than any other factor**
 - 2. Aquaculture will become more important to meet increasing global demand for fish.
 - 30. Lack of productive fishing grounds due to MCZs makes it worth-while to consider aquaculture.

Factor 4: The Inexperienced- comparison with other factors

- **Statements ranked higher in Factor 3 than any other factor**
 - 2. Aquaculture will become more important to meet increasing global demand for fish.
 - 23. Due to the lack of quota for key stocks, aquaculture is the long-term solution for the English in-shore fleet.
- **Statements ranked lower in Factor 3 than any other factor**
 - 7. Fishing is important to me because it's a family tradition.

Summary of Factors

	Pro	Contra
Factor 1 – “Traditional Fisherman”		Occupational pride and family tradition
Factor 2 – “The Worrier”	Concerned about economic aspects and having the relevant equipment	
Factor 3 – “The Thrill seeker”		Value the enjoyment they receive from fishing – which they feel would not be the same with aquaculture (less “hunting” more “farming”).
Factor 4 – “The Inexperienced”	Have heard success stories, but would need more information/training and skills to start up an aquaculture business.	



Discussion/Policy Recommendations

- Focus on factors **2** and **4**
- **Factor 2 – Offer financial incentives** (e.g. through lump sum or subsidies)
- **Factor 4 – Offer training and information**

→ **We identified the socioeconomic barriers, financial help and development of skill set for certain population of the English in shore fleet.**



Further Questions ?

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