Spatial distribution of the nutrient plume emanating from an Integrated Multi-Trophic Aquaculture (IMTA) farm in British Columbia: Use of an *in-situ* kelp bioassay to monitor nutrient loading

By

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B.Sc. University of British Columbia, 2006

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Abstract

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To assess the spatial distribution of nutrient wastes around an open-water integrated fish/mollusk/kelp farm *in-situ* kelp bioassays were employed. Growth rates were measured over a four-month growing season and used as a proxy for relative nutrient concentrations. Seasonality and depth effects on growth rate were also assessed. Growth around the pens was 0.20 cm · day^{-1} higher than at the control, and reached a maximum of 1.4 cm · day^{-1}. Optimal growth was achieved at 8 m. Growth at 8 m was significantly higher by 1.5 cm · day^{-1} compared to surface waters at 2 m. Early spring had the highest growth rates with a peak of 1.4 cm · day^{-1} recorded on June 21. This study re-iterates the fundamental benefits of IMTA and shows the potential of *in-situ* assay as an alternative to error-prone and costly water sampling to asses nutrient status in water.

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Chapter 1: INTRODUCTION

1.1 Aquaculture-its Role in Global Food Security

From the latest United Nations report on population statistics there were more than 6.8 billion people in the world as of 2010 (FAO 2012). A value projected to grow to 8.9 billion by 2050 (FAO 2004). The majority of this growth is occurring in developing nations in Africa, Asia, Latin America and Oceania (FAO 2012). These demographics are going to create a number of challenges in the years to come, including issues with hunger and securing a sufficient, long-term food supply.

In 2010, more than 1 billion people were classified as lacking access to the minimum amount of food needed to maintain a healthy weight and perform basic, light activity (FAO 2010a). This minimum is approximately 2600 kcal consumed per day, or less than four big macs (approx. 700 kcal each), compared to an American average of 3900 kcal per day (FAO 2011; U.S. Census Bureau 2006). Unequal distribution of food from nations with surpluses to those with food deficits is the largest cause of hunger and food inequality globally. It is because of this that, although production has been able to keep pace with population growth, there are still so many people undernourished (Godfray *et al.* 2010). Although food distribution is the major cause, supply will still need to increase along with population growth to meet the increasing food demands.

In countries where hunger is the greatest there is typically low availability of protein. Fish account for roughly 16 percent of animal protein intake and in the most poverty stricken countries this can reach as much as 20 percent (FAO 2010b). Although not the major contributor to diets, this still translates into a significant amount, providing an important source of food. Because of dwindling wild stocks, aquaculture is poised to take a large share of the burden of maintaining supply for these food needs. As well as its potential to sustain a long-term food supply, aquaculture could bolster weak economies through job creation and associated economic benefits (Brummett and Williams, 2000).

A common index of poverty considers the number of people living on less than US$1.25 per day (World Bank 2008). Globally, this has dropped from 1.3 billion in 2005 to under 0.9 billion in 2010 (Chandy and Gertz 2011). The majority of people living on this poverty line reside in parts of Africa, Asia and Central America (Chandy and Gertz 2011). These are regions that contribute the majority of total aquaculture production, with Asia accounting for 89 percent of the total as of 2008 (FAO 2010b). Aquaculture represents an important industry for these countries and could provide a significant means of reducing poverty and providing livelyhoods for rural poor. In 2008, these countries combined produced 93 percent of the global total, valued at US$84 billion (FAO 2010b). As aquaculture continues to expand, it will play an important role in food security and economic development to some of the globe’s poorest people.

1.2 Aquaculture-its Role in Global Seafood Production

Global fish supply is shifting steadily away from capture fisheries because of declining stocks, and aquaculture is taking up the slack by providing a larger proportion of the total for a diverse range of species. World fish stocks are suffering from over-exploitation, and a continued harvest at the same level will not be able to provide a sustainable source of seafood. A 2010 report by the United Nations on the state of world aquaculture and fisheries describes these trends and explains the historical changes fish stocks have undergone, and are likely to undergo in the future (FAO 2010b). From 1974 to 2008, the number of fish species classified as overexploited has risen by 10 percent, and as depleted by 32 percent. Most of the species that are still viably fished are done so at a maximal rate that cannot withstand an increase in quota that a growing global population would demand. In contrast, in 1970 it was estimated that 40 percent of fish populations were robust enough to withstand increased quotas (FAO 2010b). This provided a safety net for global fish supplies and allowed a degree of leeway for bigger catches if demand increased. This safety net no longer exists and, on a global scale, there are less fish available to harvest. An increasing demand for seafood will have to be met by aquaculture.

Aquaculture is providing a larger share of global fish production and is consequently creating an increasing level of employment and revenues in developing regions of the world. In 2008, global fish supply was 142 million tons and just under half of this was generated from aquaculture (47 percent) (FAO 2010b). Historically, aquaculture production has been low. However, and over a period from the 1950's to 2008, total output increased from 1 million tons to 68.3 million tons valued at US$106 billion (FAO 2010b). This is a drastic increase over a relatively short period and shows the potential both for improvements and for further growth in the industry. This trend of increasing market share is predicted to continue into the future, with more and more of the global fishery supplied by aquaculture. Besides providing a potentially secure source of fish protein, this rapidly growing industry is generating jobs.

Fisheries and aquaculture represent a large amount of employment on a global scale and, when combined with the number of dependents supported, provide livelihoods for approximately 540 million people (FAO 2010b). Although most of this employment comes from capture fisheries, aquaculture is providing more jobs as it grows and its market share increases. Employment in capture fisheries is declining for a number of reasons, including more efficient fishing fleets requiring smaller workforces and generally lower catches (FAO 2010b).

In a global context, Asia is by far the greatest contributor to aquaculture production, with a number of other countries as of yet playing a more minor role. Asia on the whole accounts for over 88 percent of global production, and China alone 62 percent (FAO 2010b). Outside of Asia, the remaining proportions are split between other regions. For instance, North and South America together are the second largest producers, with production concentrated in Latin America. They produce a significantly greater amount than North America, which only accounts for 1.2 percent of the total

(FAO 2010b). Aquaculture is diverse in these regions and a number of species are cultured in different environments.

Marine aquaculture accounts for 32 percent of global production and of this, mollusks and marine fishes represent the second and fourth largest groups, respectively (FAO 2010b). Of the mollusks produced, 32 percent were oysters, and 11 percent scallops (FAO 2010b). Atlantic Salmon dominated production of diadromous fish with Chile and Norway being the major producers (FAO 2010b). Aquaculture accounts for a significant proportion of production for many different species. It contributed 64 percent of mollusk production and 68 percent of diadromous fish production (FAO 2010b).

Aquaculture of plant species represents a smaller share of market value and world production, but still has significant demand. From the period 1970 to 2008 the production of aquatic plants from aquaculture has grown an average of 8 percent per year, and in 2008 15.8 million tones were harvested and valued at US$7.4 billion; the majority of these being seaweeds (over 99 percent) (FAO 2010b). Although these are produced in a number of different regions globally, production is dominated by a small number of countries.

The vast majority of seaweed culture occurs in Asia, whose production accounts for over 99 percent of global value and biomass (FAO 2010b). Outside of Asia, it is Chile and Africa that are the next largest producers, providing 21 700 and 14 700 tones, respectively (FAO 2010b). A few species dominate culture efforts and world production, the majority being used for human consumption followed by use in iodine, algin, and carrageenan production (FAO 2010b). It is estimated that, in 2008, relative production in descending order was: Japanese Kelp (*Laminaria japonica*), *Kappaphycus alvarezii* and *Eucheuma spp.*, Wakame (*Undaria pinnatifida*), *Gracilaria spp.*, and finally Nori (*Porphyra spp.*) (FAO 2010b). The kelp used in our experiment is highly similar in biology and market niche to *Laminaria sp.*, the highest producing group, and was in the same genus before taxonomic changes moved it to *Saccharina*. Its total production (*Laminaria japonica*) was 4.9 million tones in 2008 (FAO 2010b). There is a growing market for kelps, and development of farming systems in Canada may allow the Canadian industry to grow and benefit from this demand.

1.3 Aquaculture in British Columbia

Marine aquaculture in Canada is dominated by salmon farming, an industry whose roots were pioneered in Norway and Scotland and brought here relatively recently (AAFC 2011). It was in the early 1970's that Canadian farmers attempted to emulate the successes of farms located in the fjords of Norway and Scotland. In British Columbia, the first farms were established on the Sunshine Coast region in the South of the province (AAFC 2011). Crown Zellerbach was an early pioneer, but further expansion of the industry was slow, with only 15 farms in operation by the end of 1981 (Cross 1990). Through the rest of the 1980's there was an explosion of investment from European countries, particularly Norway, which saw a large potential for growth and already had the infrastructure and expertise to expand into new waters (Heen *et al.*

1993). Norway still has a strong presence in BC with two of the largest companies based from there, Marine Harvest and Mainstream. Coho, Chinook, and Sockeye were the first species farmed, but this changed as demand for Atlantic Salmon increased. Now they account for 76 percent of the total production and are grown on 131 farms (FOC 2011b). In these early days, there was limited government regulation of the industry. Growing concerns over potential environmental impacts led to a moratorium on new licenses in 1995 *(*Noakes *et al.* 2003*)*. The government addressed these concerns with environmental assessments that eventually led to both federal and provincial branches being satisfied that current practices were safe and allowing new licenses to once again be issued (AAFC 2011). Currently, Canada is the fourth largest producer of Salmon after Norway, Sweden, and the UK, and production has increased four-fold over the past 20 years (FOC 2011a). The latest change to the industry in BC came in 2010, when aquaculture shifted from being provincially regulated to being under the control of the federal government (Government of Canada 2010).

Marine aquaculture is dominated by salmon and shellfish culture and the majority of farms are distributed along the coasts of Vancouver Island and the southern portion of the mainland (BC MAL 2010; BC MOE 2010). By value and yield, salmon culture provided the greatest return in 2009 with a total harvest of 76.3 thousand tones worth $394.2 million farm gate value. Of the salmon produced, it is Atlantic species that dominate, accounting for 90 percent of production (AAFC 2011). Shellfish production was quite a bit less, and production reached 7300 tones worth $16.9 million in 2009 ((BC MOE 2010). The majority of fish farms in BC are concentrated around Tofino on the

West Coast of Vancouver Island and along the mid to north regions of the Strait of Georgia. Although these two groups account for the majority of aquaculture in BC, seaweeds are also grown but to a much lesser extent.

In BC, the seaweed industry is quite diverse when compared to the East coast, which is dominated by two species compared to ten in the West (FOC 2011b). These include members from the three main groups of algae (the reds, greens, and browns) and span a range of uses from pharmaceuticals to foods. In BC, agar is the most successful seaweed product and is extracted from the red alga *Gelidium* and used in the pharmaceutical and food industries (FOC 2011b). As of 2009 there were eleven licenses for seaweed farms compared to 133 for finfish and 499 for shellfish (BC MOE 2010). Aquaculture in BC is diverse and there is potential for further, sustainable growth in the industry.

1.4 Fed Aquaculture Systems

There has been considerable controversy over fed aquaculture systems and their environmental impacts on both a local and distant scale. These concerns include fish feed composition, fish wastes released from the farm (i.e. uneaten food and feces), escapes into the wild, parasites and diseases, chemotherapeutants, marine mammal entanglement, anti-fouling paints and negative aesthetic effects on shorelines. In British Columbia, the salmon farming industry in particular has received negative media and NGO attention, which has given the finfish industry in general a bad reputation. This paper deals only with the nutrient waste release aspect and so only fish feeds (the starting nutrient input), the generated wastes and their impact on the ecosystem will be addressed.

1.4.1 Fish Feeds

Fish feeds are dependent on fishmeal and fish-oil as a source of protein and essential oils for fish nutrition. These come from wild-catch fisheries of small, pelagic fish such as sardines, anchovies, and eels that are often seen as ‘trash-fish’ (Powell 2003). Although given this designation because of their low market value, these small fish play a key ecological role in supporting the food chain. Their removal from the ecosystem can have significant local impacts and they are often taken from already dwindling populations. These fish are processed into protein-rich fishmeal and fish-oil that can be used for a variety of purposes. Feed production for aquaculture, poultry and pigs can use the meal as a source of protein, oils and essential minerals (Powell 2003). In 2006, 68% and 89% of global fishmeal and fish-oil, respectively, went to the production of aquafeeds (Tacon and Metian 2008). This is approximately equivalent to 16.6 million tons of small forage fish (Tacon and Metian 2008). Once converted to feed pellets, this total biomass is used to different levels of efficiency depending on the cultured species it is fed to.

One means of reducing reliance on wild fish is to farm species that require less feed to grow to market size. Different species of livestock have vastly different feed conversion ratios (FCR), the efficiency with which a given amount of feed is turned into animal biomass. For instance, cattle and sheep can have values between 7 and 10 while poultry and pigs can be as low as 2 (Clift 2010). On average, aquaculture production in 2006 was done quite efficiently, with a FCR of 0.7 (Tacon and Metian 2008). This means that 0.7 kg of feed will result in 1 kg of fish at harvest. This being said, feed efficiency can be quite variable between different aquatic species.

Efficiency in aquaculture has seen a steady improvement in the past number of years, with the major cultured species requiring significantly less input of wild-caught fish to produce a given amount of biomass. From 1995 to 2006, the largest improvements occurred in carnivorous fish, for instance salmon dropped from 7.5 to 4.9, trout 6 to 3.4, and marine fish 3 to 2.2 (Tacon and Metian 2008). In contrast to carnivores, it is the omnivores and herbivores that may provide the greatest potential for efficient biomass production. Species in these groups are net-producers, and lead to a greater biomass output per unit of protein input. For instance, Chinese carp (0.2), tilapia (0.4), and freshwater crustaceans (0.6) all produce more protein per kg of feed input (Tacon and Metian 2008). How much of the fed protein, fat, and energy is actually retained is also important for considering waste and efficiency. While Salmon retain 30 percent, chicken, pigs, and sheep keep only 18, 13, and 2 percent respectively (New and Wijkstrom 2002). Comparing these values it can be seen that aquaculture is an efficient means of protein production, with quite a good return on initial investment, with the potential for further improvements in the future.

As aquaculture of carnivorous species grows, and wild stocks of fishmeal and oil diminish, there is an incentive to find alternative sources of these two essential feed ingredients. The price of fishmeal and oil have more than doubled since 2005, and this is giving farmers and feed companies incentive to find alternate ingredients for feeds. Plants such as soya, corn, rapeseed, sunflower, flax, and wheat gluten with high protein and fat contents are being tested with mixed results (Powell 2003). The difficulty with replacing animal protein and fats with plant material is in digestibility and meeting the nutritional needs of the fish.

Replacing fishmeal with a high-protein substitute such as soy or wheat gluten has the potential to provide enough protein, but most fish cannot digest it as easily and end up producing more fecal waste and not actually retaining as much protein (Naylor *et al.* 2009). Replacing fish oils has been attempted with plant oils such as flax, canola, olive, and soya, but one difficulty is in lower levels of the essential long-chain omega-3 fatty acids (Naylor *et al.* 2009). There are a great variety of potential sources of protein and oil that could alleviate the pressure on both sensitive fisheries and farmers facing ever increasing feed prices. This is an important issue for farm waste considerations as more indigestible feeds will lead to larger benthic loads of fecal matter and subsequent dissolved nutrient wastes.

1.4.2 Fish Wastes

For the sake of efficiency and profitability, modern aquaculture involves culture of a large number of fish in relatively small areas. This leads to the production of significant amounts of effluent wastes that can have impacts on local habitats. Wastes can be divided into four categories: waste feed, feacal matter, metabolic wastes, and biocides. All of these (except for some biocides) come from feed, which is the main input on the farm, and efforts to minimize them have focused on diet formulas, feeding regimes, and the efficiency of feed utilization by the fish (Cho and Bureau 1997).

Of the total amount of feed given to farmed fish there will be a certain proportion that does not get used (Beveridge 2004). Feed can settle to the bottom or dissolve in the water before it is eaten for a number of different reasons. Farmers have both economic (feed is costly) and environmental incentives to minimize this wastage. Government regulations provide guidelines for maximal benthic waste load, which will be reached quickly if feed is settling at high rates (Government of Canada 2010). Fish must be hungry and be able to recognize that food is present. The pellets must then be able to get to the fish, which can be hampered by currents and high stocking densities, and they must swallow it, which they may not if over-fed or if the pellets taste wrong (Beveridge 2004). In the early days of aquaculture, the majority of wastes generated were attributed to feed loss. For salmon cage culture, estimates ranged from 1-30 %, but have dropped to approximately 3-5 % in modern systems (Gowen and Bradbury 1987; Beveridge *et al.* 1997; Beveridge 2004). This represents a significant improvement and means both an economic savings for farmers and reduced inputs to the environment. These improvements in feeding efficiency have come from using new technologies, new feed formulations, and refined feeding strategies (Reid *et al.* 2009). For instance, cameras suspended at the base of pens are used to manage feeding by showing when pellets begin to fall through cages, an indication that fish have stopped feeding (Ang and Petrell 1997). Feed type can also play a role, where types that dissolve too easily, sink too quickly, or are of an inappropriate size can make it difficult for fish to feed. For instance, extruded pellets have a slow sinking rate and greater stability in water compared to compressed pellets, and can therefore improve feeding efficiency (Pillay 2003). Although waste feed does contribute to total farm wastes, it is the fecal matter that accounts for the vast majority of effluent from modern cage culture.

Once ingested, the feed passes through the gut where it is digested, nutrients are absorbed, and undigested components are released as feces. The feces then settle to the bottom where they decompose to release their component nutrients. Total fecal load from a given farm depends on a few factors, including the number of fish in production, their feed conversion ratio, and the digestibility of the feed. Larger farms will have more fish and inherently a greater load of feces produced and released to the system. In general, feeds high in carbohydrates and low in protein content are harder to digest and will have a greater proportion eliminated through digestion (Rychly and Spannhof 1979; Pillay 2003). Modern Salmon feeds can be up to 85% digestible, creating 15% fecal matter per unit of feed (Reid *et al.* 2009). Metabolic wastes are excreted through gills and kidneys and are mostly in the form of ammonia and urea (Cho and Bureau 1997). Again, quantity of these wastes released depends on species, feeding and the number of fish present.

An estimate of nitrogen release for salmon considered an average flesh content of approximately 3% N fed a diet containing 8% percent N and predicted that 22% of the fed nitrogen is retained, while the remaining 78% is released into the water (Gowen and Bradbury 1987). The majority of nitrogen is released from the fish as ammonium, with a smaller proportion as urea, and with exact amounts depending on species and feed composition (Pillay 2003). For instance, ammonium production in salmon hatcheries was estimated to be 28.9 kg and in Tilapia 34.2 kg per ton of feed consumed (Liao and Mayo 1974). Another study considered feed composition and found that the amount of ammonium released from Tilapia was directly proportional to the percentage of nitrogen in the feed (Brunty *et al.* 1997). Other nutrients such as phosphates, in particulate form, and bicarbonate are also released from fish farms but have a less drastic effect on marine ecosystems compared to nitrogen (Pillay 2003).

1.4.3 Environmental Impacts

One of the largest impacts of fish farm effluents to local ecosystems is the imbalance created in nutrient dynamics and the shift towards highly nutrified, eutrophic conditions. Eutrophication occurs when a previously limiting nutrient is present in unusually high concentrations such that any organism depending on that nutrient will increase productivity. This is a problem because it alters the community structure of the local ecosystem and greatly increases primary productivity to the potential detriment of other levels in the food chain and water quality parameters that other organisms depend on. For instance, spiking algal productivity creates dense blooms that block light from other organisms. It was also found that grazers increased their predation in areas of high nutrient concentration (Russell and Connell 2007).

Both dissolved and sedimented nutrients impact local ecosystems by changing the existing nutrient balance and promoting growth of certain species to the harm of others. Fecal matter and residual feed sink to the ocean floor and it is the organic nitrogen and carbon compounds they contain that impact the local environment (Pillay 2003).

Nutrient fluxes in the coastal waters of the northeast Pacific are characterized by high, consistent concentrations in the winter that diminish through the spring to low, fluctuating levels in the summer and fall (Fujita *et al.* 1989). From May to September, periodic upwelling events occur and cause pulses of nutrients to be delivered to the water column (Fujita *et al.* 1989). These fluxes in nutrients are natural and keep a balance to productivity. Inputs from external sources such as industry or agriculture throw this cycle off by creating elevated and more consistent concentrations in the water.

1.5 Integrated Multi-Trophic Aquaculture

1.5.1 Design Principles

Due to increasing concerns over environmental impacts from fish farming, there has been pressure to innovate new methods of aquaculture with a smaller ecological footprint. Integrated multi-trophic aquaculture (IMTA) addresses the problem of nutrient pollution. It takes an ecological approach to reducing wastes by mimicking the trophic diversity inherent in natural ecosystems. It involves the traditional farming of a fed species of fish, but incorporates other organisms that are capable of extracting the released wastes. These extractive species include seaweeds that absorb dissolved nutrients and filter feeders that consume the larger particulate matter. This idea has been borrowed from Asian and other countries, where polyculture has been practiced for millennia.

Use of fish-rice culture is widespread in many parts of Asia and is one of the earliest examples of integrated polyculture. In China, this dates back to the Eastern Han Dynasty (25-220 AD) and is still used for its reduction of insect and weed pests and general improvement to rice yield (up to 47 percent) (Kangmin 1988). The fish live amongst the rice in the flooded paddies and feed on insects while fertilizing the plants through their waste. This system is also widely adopted in many other rice-producing countries in Asia, as well as extending into Egypt in Northern Africa (Frei and Becker

2005). Another example is the combination of ducks, fish, and crayfish in Northern Europe (Neori *et al.* 2004). These are similar to modern forms of polyculture aimed at bioremediation in that they incorporate organisms from different trophic levels, which is a key principal of IMTA (Chopin 2006). Modern uses of polyculture have similar goals, but have the added deliberate focus of removing environmental pollutants.

Developing IMTA systems has involved experimentation with different species combinations and extensive research into their effect on pollutant release. One of the earliest systems was developed around a sewage outfall in the United States to reduce nutrient concentrations in the waste stream (Ryther *et al.* 1975). The authors grew microalgae in the wastewater and fed it to a range of bivalves. Bivalve wastes were then consumed by invertebrates that in turn fed commercially important fish and lobster. This system also incorporated seaweeds in a final step to remove any remaining dissolved nutrients (*Chondrus, Gracilaria, Agardhiella,* and *Hypnea*). In another study, Wang (1990) recognized the problem of high algal and sediment concentrations in pond water of shrimp farms and integrated oyster culture with the result of vastly improved water quality and improved oyster growth. In Israel, there has been extensive research into land-based recirculating systems (Shpigel and Blaylock 1991; Muki Shpigel *et al.* 1993; Krom *et al.* 1995; Neori *et al.* 2004). In these systems, waste from cultured fish is piped into successive tanks of filter feeders and seaweeds where particulate and dissolved fractions are removed, respectively. For instance, one pilot project integrated Seabream (*Sparus aurata*) culture with tanks of oysters (*Tapes*) and the seaweed *Ulva (*Shpigel *et al.* 1993*)*. They calculated that the final effluent contained 4 percent of the total nitrogen that was input as feed, the remaining 96 percent having been incorporated into the three species grown.

Work with open-water systems has occurred in many different countries including Canada, United States, Japan, Scotland, Chile, and China (Hirata and Kohirata 1993; Stirling and Okumus 1995; Troell *et al.* 1997; Rawson *et al.* 2002; Chopin *et al.* 2003;(MacDonald et al. 2009)). These studies experimented with a wide range of organisms including Salmon, Grouper, and Pompano fed species, oyster and mussel filter feeders, and *Gracilaria, Laminaria saccharina, Porphyra*, and *Ulva* seaweeds. All found positive impacts in a number of parameters tested (e.g. dissolved nutrients, oxygen levels and species growth). For instance, Jones and Iwama (1991) found that oysters suspended near Salmon pens in British Columbia had shell heights that were up to three times those at control sites. Most of these studies were on an experimental scale with the end goal of scaling up for application to existing and new farms at a commercial level.

Current use of IMTA at an industry scale is not widespread, but there are a few key examples of farms growing a range of species. On the west coast of Canada in British Columbia, Kyuquot SEAfoods has combined the culture of Sablefish with kelp (*Saccharina latissima*), scallops and sea urchins in open-water cage culture. This farm is also licensed to produce blue mussels and sea cucumbers and is in the process of scaling up to larger production and diversity (Cross 2004). As well as the environmental and economic benefits of such diversity, this farm employs members of the local First Nations community and is an important part of the local economy. Cooke Aquaculture on the East coast of Canada is experimenting with IMTA and has five amended salmon farms growing mussels and kelp (Barrington *et al.* 2009). Another example is the land-based SeaOr Marine Enterprises located on the Israeli Mediterranean coast (Neori *et al.* 2004). This farm cultures gilthead seabream (*Sparus aurata*) (a marine fish), two species of seaweed (*Ulva* and *Gracilaria*), and Japanese abalone. The seaweed acts to filter the seabream effluent and is fed to the abalone on site. Although these are three examples of successful moves away from the traditional monoculture, the implementation of IMTA on a large scale is not widespread.

One of the major obstacles to the expansion of IMTA is convincing industry that there is good economic incentive to invest in a new production system. Two ways researchers are trying to do this are through market surveys and economic analyses. A number of studies conducted on the East coast of Canada in New Brunswick asked the public about their perceptions of IMTA (Ridler *et al.* 2007; Barrington *et al.* 2010). They found that most people felt that IMTA could improve the environmental sustainability of salmon farming (65 percent), benefit the local economy (96 percent) and improve the competitiveness of the industry (96 percent) (Barrington *et al.* 2010). They also found that many respondents (up to 50 percent) were willing to pay more for IMTA produced seafood. These results indicate that there could be a niche market for IMTA branded products and that adopting integrated aquaculture could improve social acceptability of the industry. The economics of integrated salmon, mussel, and kelp farms was also analyzed and it was found that such a system would increase profitability and reduce risk through diversification. Caution should be taken when applying these results to the west coast of Canada however, as there could be real differences in existing public acceptance of aquaculture. All of these results point towards the great economic benefits of investing in an IMTA system and could help to convince industry of the usefulness of an integrated and diversified system.

1.5.2 The Role of Seaweeds and Kelps

Seaweeds are primary producers at the bottom of the trophic system and are used in IMTA for their nutrient absorbing and sequestering properties. Their growth is dependent on a number of nutrients that are also found in, and released from, fish wastes as they dissolve in the water column. Many of these are normally limiting in the environment and so the seaweeds are able to use them to enhance growth over normal background levels, while at the same time removing these potentially harmful compounds from the ecosystem. Storage occurs both as biomass from growth and in cells in organic and inorganic forms. The harvested seaweed blades represent packets of nutrients that are taken out of the water column surrounding the fish pens. When harvested, this amount of nutrient waste is effectively removed from the ecosystem. It is important for farms to use species that have a good nutrient uptake and storage capacity, while also having a commercial market. For instance, Kelps such as *L. saccharina* or think bladed Nori (*Porphyra sp.*).

1.6 Nutrient Dynamics in Seaweeds

Seaweeds rely on a number of different nutrients that occur in a variety of naturally occurring forms. For most species, these include approximately eighteen essential elements (N, P, Cl, S, Si, Na, Ca, Mg, Fe, K, Mo, Mn, Zn, Cu, Co, V, Br, and I) (Graham *et al.* 2009). Of these, nitrogen, phosphorus, iron, and silica are typically required in the largest amounts and are used for a wide range of purposes from structural to reproductive and metabolic (Graham *et al.* 2009). For instance, nitrogen compounds are incorporated into amino acids, nucleotides, and chlorophyll and phosphorus is essential for energy dynamics in ATP and in reproduction as a component of DNA (Graham *et al.* 2009). As in any plant, when one or more of these is in low abundance, growth will be slowed. In the marine environment it is typically nitrogen that is limiting, and in fresh-water ecosystems phosphorus. Because of this, marine fish farms must focus on nitrogen remediation when looking at ways of stemming the effects of the dissolved component of wastes, as it will have the greatest impact on local productivity and community structure. Although this paper deals mainly with the marine habitat and remediation of the dissolved component of wastes, IMTA also has applications in fresh water systems and so phosphorus will also be included.

In aquatic habitats, nitrogen and phosphorus occur in a variety of forms useable by seaweeds. In marine waters, nitrogen is most abundant in dissolved gas form (N_2), but cannot be directly absorbed by seaweeds like this. Nitrate (NO_3^-) and ammonium (NH_4^+) are the next most abundant inorganic forms and both are readily used by seaweeds (Lobban *et al.* 1985). Urea (NH_4CO) is also a useable nitrogen source and is found in much lower concentrations around fish farms, but is important here because it is a metabolic by-product of fish and significant effluent from farms. Phosphorus occurs most commonly as HPO_4^{2-}, PO_4^{3-}, and $H_2PO_4^-$, all of which are in usable forms (Lobban *et al.* 1985).

How these nutrients are taken up varies over the course of the growing season with excess being stored in times of high abundance. Uptake rate follows the natural cycle of the nutrients. In winter months, when concentrations are high, uptake is very rapid and any excess not immediately used for growth is stored in organic (i.e. free amino acid) and inorganic (i.e. NO_3^-) forms (Wheeler and North 1981). This trend is reversed in the summer when concentrations are low and continued growth is largely dependent on the stored winter reserves. This trend has been shown in *Laminaria saccharina* and *Nereocystis leutkeana* collected from sites adjacent to Salmon farms in BC, where uptake rates of ammonium and nitrate increased linearly with ambient concentrations (Ahn *et al.* 1998). In the kelp *Laminaria longicruris*, internal reserves of nitrate increased through the winter months to reach a level 28,000 times that of ambient concentrations (Chapman and Craigie 1977). Stored organic nitrogen also followed this trend and both reached a peak in March. It was found that these stores allowed continued high growth rates past the time when nitrogen concentrations in the sea were diminishing, and that there was a lag period of two months before internal reserves were depleted. These results are significant for farms incorporating IMTA because it shows that further sequestration will occur in the fall and winter at a time when normally all blades have been harvested. They also demonstrate the great capacity of seaweeds to concentrate and remove large amounts of nutrients from the water column.

As well as season, uptake shows a preference for certain nutrients and chemical compounds of those nutrients. For instance, across a wide range of species, uptake rates of nitrogen are consistently higher than phosphorus and ammonium higher than nitrate (Wallentinus 1984). Because of the pulsed nature of nutrient releases from fish farms, there is a small window of opportunity for the wastes to be removed. These differential uptake rates mean that nitrogen will be removed more efficiently than phosphorus, and those compounds with relatively slow uptake rates will be missed and allowed to escape into the surrounding water column. This aspect of the seaweed biofilter has implications for the effectiveness and efficiency of IMTA systems as some of the farm wastes could be missed.

Pulsed nutrient releases are common in the sea when upwelling from nutrient-rich waters and run-off from productive terrestrial habitats occur. Seaweeds have adapted to take advantage of these through rapid nutrient uptake and storage of any excess beyond their immediate requirements (Rosenberg *et al.* 1984). This is an important adaptation that allows the plants to take advantage of these short spans of nutrient abundance, and is important for the efficient removal of pulsed nutrients around IMTA sites. This is because fish farms represent another type of pulsed nutrient event due to the periodicity of release of metabolic and other wastes from the fish.

Another aspect of nutrient uptake that IMTA systems must take into account is the effect of age of the cultivated seaweeds. In most mariculture systems a crop is planted, then left until mature and then completely harvested for sale. This strategy may not be the most effective strategy for nutrient sequestration because of certain differences in uptake dynamics between first and subsequent year plants. In the Kelp *Laminaria*, it has been shown that first year plants have a 2-3 fold higher uptake rate of ammonium and nitrate compared to second and third year growth, but have a much lower capacity for uptake at night (Harrison *et al.* 1986). This indicates that leaving some plants behind from the previous year’s crop could improve nutrient sequestration by keeping uptake consistent over time.

As well as plant age, the species of seaweed is another important consideration because of variability in uptake capacity of different morphologies. Uptake rates of phosphate (PO3-4), nitrate (NO3-), and ammonium (NH4+) were investigated for a number of different macroalgae of varying blade thicknesses (Wallentinus 1984). It was found that thin bladed species with high surface area to volume ratios had higher rates of uptake. This has implications for IMTA because many of the commercially cultivated species in the northeast Pacific are thick-bladed kelps with low surface area to volume ratios. Maximizing removal efficiency would ideally involve growing thin bladed species, such as *Porphyra*, that have an existing or potential commercial market.

Depth and light intensity also affect uptake rates. These were found to be up to 48 percent lower in plants grown in the dark compared to light, and 40 percent lower at 12 m compared to surface waters under the same light conditions (Gerard 1982). These too are important result for IMTA as they show that there is continual, although reduced, sequestration of nutrient wastes throughout a 24-hour period. It also gives some indication of optimal planting depths in relation to uptake efficiency, as deeper plants had lower rates of uptake.

Growth in seaweeds is seasonal, but reversed to most other plants, with the greatest productivity occurring in the winter months and early spring and declining in the summer (Klaus Luning 1993). This is a result of a number of different factors including annual nutrient cycle, temperature, day length, and a natural circadian rhythm (Klaus Luning 1993). This has been investigated in the kelp *Laminaria longicruris*, whose growth was found to be highly correlated with the increased nitrate concentrations found in the winter (Chapman and Craigie 1977; Chapman and Lindley 1980). In general, growth rates are directly dependent on ambient nutrient concentrations.

Although seaweeds do have a great capacity for concentrating nutrients, it is their rapid conversion of these nutrients to biomass that make them great bioremediators. Macroalgae have very high growth rates that make them incredibly productive, generating large amounts of biomass over a given growing period. Estimates of productivity range from 3.3 to 11.3 kg m^{-2} yr^{-l} dry wt. for a number of different species (e.g. *Macrocystis, Laminaria, Ecklonia, Sargassum)* (Gao and McKinley 1994). These values were applied to cultivated *Laminaria japonica* and extrapolated over a whole growing season to determine a total annual production of 1300 tons ha^{-1} fresh weight (Gao and McKinley 1994). To compare to land plants, sugar cane is the most productive crop under cultivation, yet is 6.5 times less productive than *Laminaria*

(Gao and McKinley 1994). Macroalgae have a huge potential for rapid biomass production, which translates into a large possible removal of nutrients from the water column.

Many studies have been done looking at the removal of nutrient wastes by seaweeds with the purpose of remediation and prevention of eutrophication. One study in Israel found that *Ulva* was very effective at removing dissolved ammonia, sequestering up to 90 percent of the amount released by tank cultured fish (Cohen and Neori 1991). Another study integrated seabreem (*Sparus aurata*) and seaweed (*Ulva lactuca*) with the result that re-circulated wastewater was maintained within safe limits of dissolved nitrogen, phosphorus, pH, and dissolved oxygen levels for the fish (Neori *et al.* 1996). Many of these studies have obtained very high nutrient removal levels using thin bladed seaweeds that have little to no marketability, which means that there is still the problem of disposal (Chopin *et al.* 2001). This can be over-come by using species that have existing market demand, which can also create an incentive for farmers to incorporate a biofiltration program into their farm-plans. There has been limited study into this and it holds potential for future work. One study has explored the possibility of using *Porphyra* as a nutrient scrubber in integrated aquaculture systems (Carmona *et al.* 2001). Another is investigating use of *Porphyra spp.* on the East Coast of Canada (Chopin *et al.* 2000).

1.7 Biomonitoring

A biomonitor is any organism that is sensitive to some parameter of its surroundings, and whose reaction to changes in that parameter can be easily measured. A diversity of plants and animals have been used as biomonitors in both aquatic and terrestrial environments for a number of different parameters. For instance, mosses and lichens have been used to indicate air pollution from trace element concentrations (Nieboer and Richardson 1979; Steinnes *et al.* 1992). Impacts of sediment loads in streams are reflected in fish and invertebrate community structures (Berkman *et al.* 1986). Heavy metal pollution in the Thames was mirrored in tissue concentrations in the seaweed *Fucus*, the barnacle *Balanus*, and the marine crustacean *Orchestia* (Rainbow *et al.* 2002). In New Brunswick, Bates *et al.* (2005) used seaweed biodiversity as a measure of ecosystem health and in the application of biomonitoring for eutrophic waters. This was done in a marine environment effected by sewage outfall and increased effluent from expanding aquaculture operations. These water parameters caused changes in seaweed assemblages, which could allow a means of monitoring. Use of seaweeds in monitoring nutrient levels has been extensive and has been used in aquaculture monitoring. Because seaweeds reflect ambient nutrient concentrations in their growth rates and nutrient content, they can be effective biomonitors of hyper-nutrification and give an early warning of eutrophic conditions. This fact is exploited in this experiment to show relative nutrient concentrations from changes in growth rates.

Chapter 2: METHODS

2.1 Purpose and Objectives

The purpose of this study is to investigate a number of aspects of the IMTA system, surrounding dissolved nutrient wastes and kelps, and addresses five specific questions:

1) To determine the extent and spatial distribution of nutrient wastes released from the fish pens of an active fish farm into the surrounding water system.

2) To explore the use of kelp as an inexpensive means of biomonitoring for hypernutrification in a marine environment.

3) To describe optimal planting location of kelp on the farm for maximal nutrient removal and biomass production.

4) To define optimal planting depth and harvest times to optimize growth and production of the kelp crop.

5) To determine the seasonal growth cycle of a kelp over a part of one growing season.

2.2 Study Site

Bioassays were deployed at an Integrated Multi-Trophic Aquaculture farm on the North West coast of Vancouver Island, in British Columbia, Canada (Fig. 2.1). This farm grows Sable Fish (*Anoplopoma fimbria*), Scallops, Sea-cucumbers, and Kelp (*Saccharina liatissima*) (Fig. 2.2). Fish are hand-fed a standard feed-pellet made by Taplow Inc. The farm is located in an enclosed bay with the dominant current moving in a circular, North-South direction. There are two stream outlets that cause fresh-water intrusions approximately 140 meters from the pens. The farm has been operational for three years and stocked with 50,000 fish over the experimental period. This represented approximately metric 100 tones of fish of different age classes. Harvesting occurred monthly and removed 2000 fish per harvest, or approximately 2 metric tones. Water depth is approximately 30 m around the farm and is quite consistent throughout the farm site.

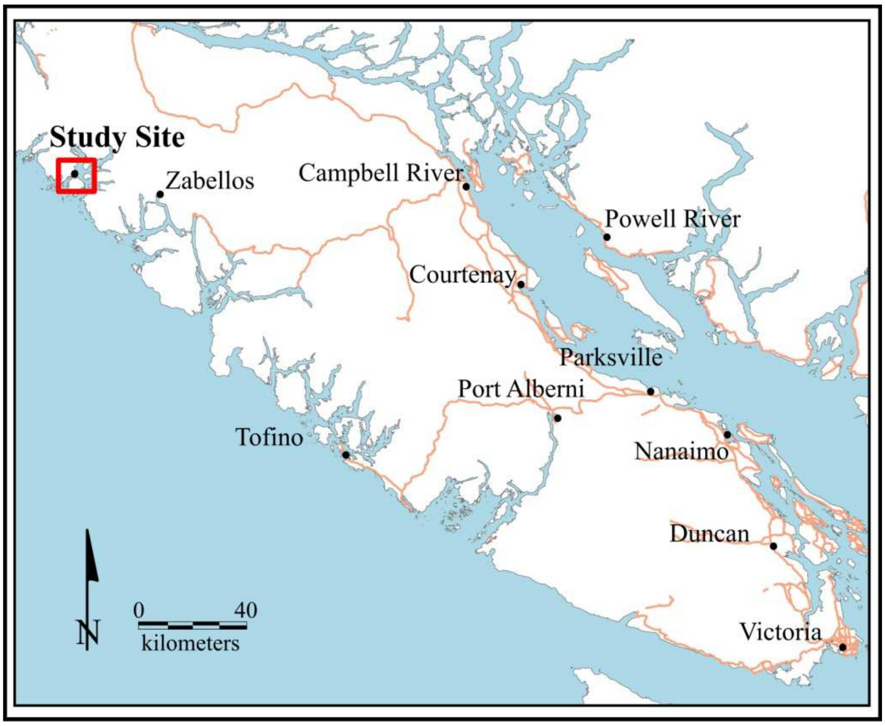


Figure 2.1: Area map showing location of farm study site on Vancouver Island, British Columbia, Canada.

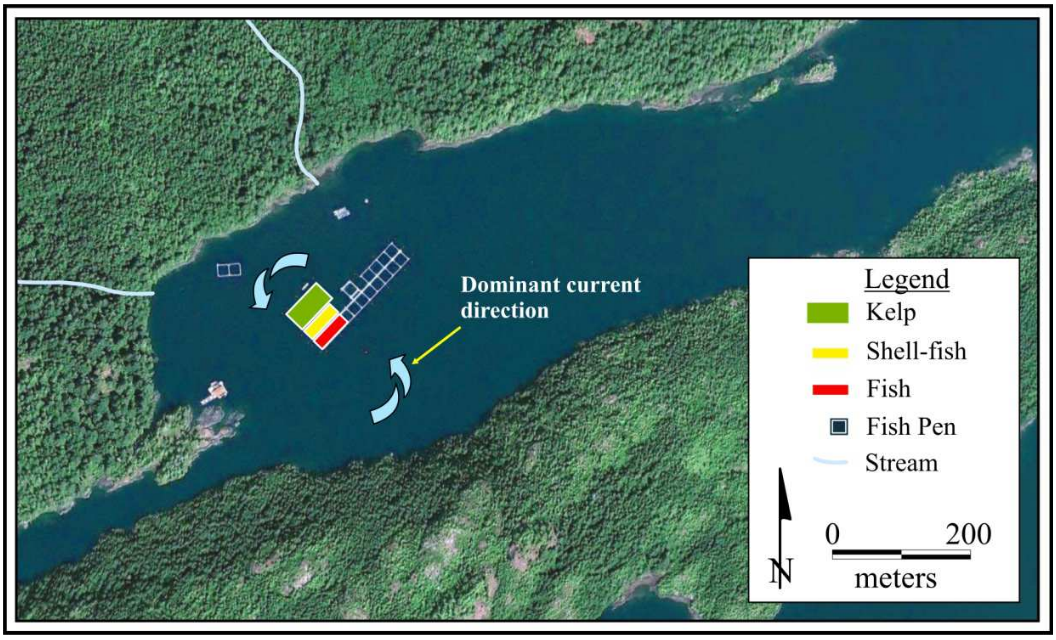


Fig 2.2: Study farm site showing location of active fish-pens (red box), shell-fish (yellow box) and kelp lines (green box). Dominant current directions shown as blue arrows and stream outlets as blue lines. Base-map courtesy of Google Earth.

2.3 Biomonitoring

Bioassays were deployed around the farm along eight transects emanating from the fish pens. These were evenly spaced in the eight cardinal directions (N, NE, E, SE, S, SW, W, NW, and N). Each assay consisted of a vertical line of rope weighted with a small concrete block, made from half-liter drink cups, and attached to a length of chain anchored with a larger concrete footing (Fig. 2.3). The lines were spaced 16 m apart and extended up to 64m away from the pens, with five lines placed at an extreme distance of 120 m near the fresh-water outlets (Fig. 2.4). These far lines were used to determine whether or not the fresh water intrusions were affecting growth. A control of 6 lines was placed approximately 700 m from the pens. Kelp (*S. latissima*) was seeded onto thin twine in January of 2010 from spores collected on-farm from the previous years crop. This was allowed to develop to the gametophyte stage, at which point the seeded twine was taken into the field for out-planting. The twine was cut into 2 cm segments and inserted into the rope at 2, 4, and 6 m depths. A few lines were seeded at 8 m to determine growth at a lower depth, but due to time constraints over the field-season this was not replicated for all lines. These were then distributed around the farm and left for the kelp to mature.

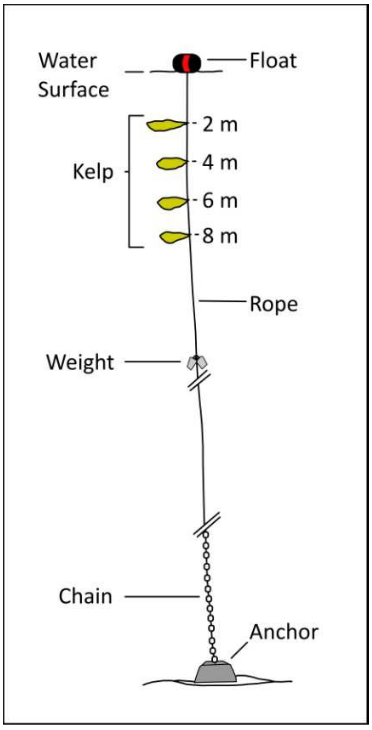


Figure 2.3: Diagram of the experimental assay showing kelp blades growing at 2-8 meter depth intervals.

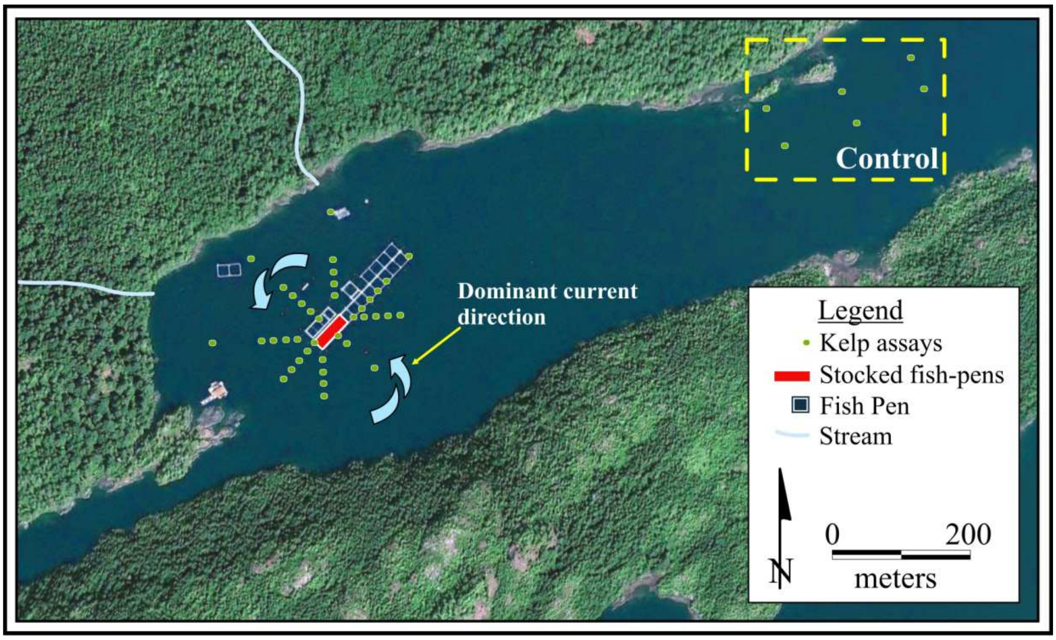


Figure 2.4: Map showing study farm with experimental array of kelp assays (green circles), around active fish pens (red square), control site approximately 700 m northeast of pens (yellow box), location of stream outlets (blue lines), and dominant current directions (blue arrows). Map courtesy of Google Earth.

2.4 Environmental Data

Kelp growth is affected by a range of different abiotic conditions that could vary around the farm and between the locations of each vertical kelp line of the biomonitoring assay. Due to time constraints, many of these could not be measured (i.e. salinity, dissolved nutrient concentrations). Irradiance at one location was measured from data collected by a weather buoy fixed to one geographical location in the water. Current direction data was already available from previous work and bay depth was taken from existing chart bathymetry.

2.5 Analytical Approach

The kelp lines described above were used to determine relative concentrations of dissolved nutrients in the water around the farm. This was done by measuring how much the kelp grew over time intervals of two-week periods. Growth was measured using a common method in phycological research that marks a place on the seaweed blade by punching a hole in the tissue a given distance from the base of the blade (Fig. 2.5; Parke 1948). The meristem of the blade is located at the junction of stipe ('stem') and blade and is a region of dividing cells from which the blade extends. By punching the blade a consistent distance away from this region, new tissue effectively 'pushes' this hole along the blade and gives a measure of elongation over the time interval from when it was punched. We found that 5 cm was an optimal distance, as anything closer was in the meristimatic region and resulted in hole enlargement and error in distance measurements. Anything over this and the hole had a high chance of being lost as the blade tips tended to either slough off or be torn at their extremities

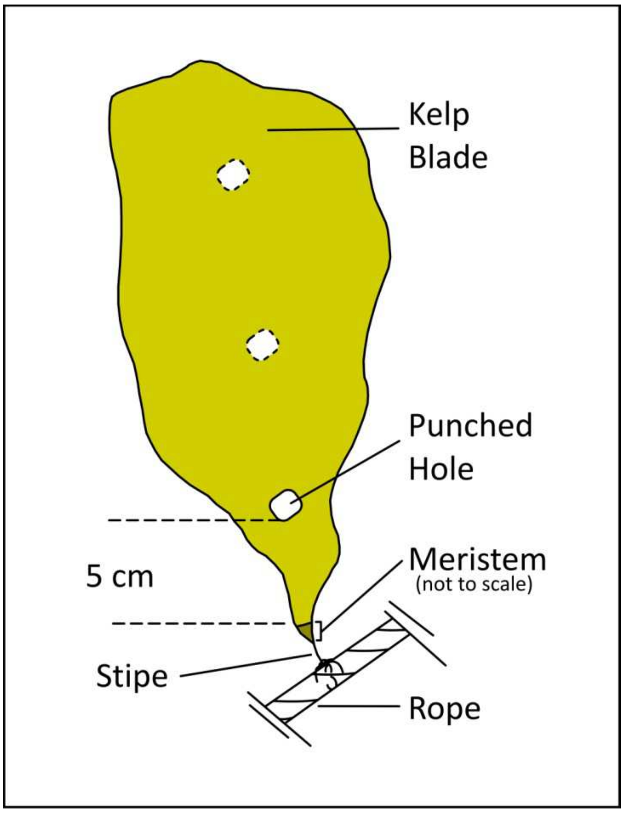


Figure 2.5: Diagram of hole-punch method used to measure kelp growth. Location of hole in relation to meristem and hole-progression over time shown (dotted circles).

Because a number of the nutrients commonly found in fish farm effluent are typically limiting for seaweed growth (i.e. nitrogen and phosphorus compounds), any inputs above background levels would cause a spike in blade elongation. Because of this, we could infer relative concentrations of these nutrients in space from how quickly the blades grew. Although the exact chemical composition of effluents was not measure, it is likely that improved growth could primarily be attributed to increases in nitrogen-containing species due to the nitrogen-limiting nature of marine ecosystems.

Sampling began in early spring (10 May, 2010), after the kelp blades had established and grown to a consistent size, and continued for fourteen weeks at two-week intervals until late summer (31 Aug, 2010). Each sampling trip involved taking a measurement of the distance between the basal side of the punched-hole and the meeting point of stipe and blade. This was done by simply pulling up the vertical bioassay lines and examining punched blades at each of the depths at which they were seeded. After this, each blade was re-punched 5 cm away from that junction and the lines were carefully lowered back into the water. The time interval was chosen to coincide with the period when kelp growth changes the most. This was from early spring when growth is most active to late summer when growth is typically at its lowest. This was done to investigate seasonal growth in general and determine if proximity to a nutrient subsidy would effect known growth patterns. Sampling occurred every two weeks to keep the growing period consistent between all samples and because during periods of high growth the holes tended to be lost at the proximity as blades sloughed off and predation occurred. The data that resulted was converted into a rate, with units of $\mathrm{cm} \cdot \mathrm{day}^{-1}$.

This approach to inferring relative nutrient concentrations was deemed appropriate if all other abiotic conditions were the same, or not drastically different, between bioassay locations around the farm.

2.6 Statistical Analysis

Data were collected for plants grown at four different depths (2, 4, 6, and 8 m) on seven sampling trips that were each two weeks apart. The main analysis included data from 2 – 6 m because the 8 m depth was limited to only a few lines. Data were averaged in a number of different ways depending on the analysis. Normality was tested with plots and a Shapiro-Wilk’s test, and equality of variance with Bartlett’s Test. When data met these assumptions, ANOVA tests were used with Tukey’s post-hoc test to look for differences between groups. When it did not meet these assumptions, a Kruskal-Wallis test was used as a non-parametric alternative with an accompanying multiple comparisons test.

2.6.1 Distance

The effect of distance from pens on growth rate was assessed in three ways. The first compared mean growth around the fish pens to a control station 700 m away, the second divided the bioassays into categories based on distance from the pens and compared growth between these (Table 2.1), and the third was a visual display of the spatial patterns of growth with an interpolated contour plot generated with a GIS. To remove pseudoreplication in time (multiple sampling of the same lines over the field season) and space (multiple sampling of the same line at different depths) the data were averaged for the seven sets of data collected and for the three depths (2, 4, and 6 m). This resulted in one mean value of growth per line. Data for 8 m were excluded from this analysis because this depth was not replicated for all lines. This also resulted in an average value that depicts the water column from 2 – 6 m, and so gives a view of nutrient distribution over a broader spatial range. The first was analyzed statistically with a Kruskal-Wallis test, the second an ANOVA test, and the third was not analyzed statistically, but used only as a means of visualizing relative growth rates around the farm site.

Table 2.1: Divisions of bioassays into categories based on distance away from pens.

Category	**Distance (m)**	**Sample Size**
Close	1	28
Mid	8 - 24	84
Far	32 - 64	125
Distant	120	22
Control	700	41

2.6.2 Depth

To again eliminate pseudoreplication over time data were averaged over the seven sampling periods and was grouped into four categories: 2, 4, 6, and 8 m. Only depths from 2 – 6 m were included in statistical analyses. Growth at 8 m was excluded because it was not replicated over all lines, but was included in a plot to give a rough idea of growth at an extreme depth. The assumptions of the parametric tests were not met and so a Kruskal-Wallis test was used as an alternative. Lines deployed at the control were excluded from the analysis.

2.6.3 Season

The effect of season on growth rates was investigated for the period from 10 May to 3 August 2010. Data were averaged over the three depth measurements to remove pseudoreplication from sampling the same bioassay multiple times. This resulted in one value per line for each sampling date. As above, the assumptions of normality and equal variance were not met and a Kruskal-Wallis test and accompanying multiple comparisons test were used. Lines deployed at the control were excluded from the analysis.

Chapter 3: RESULTS

3.1 Spatial Patterns-Horizontal

On a large scale, comparing between the control and all other lines, growth was 0.20 cm · day^{-1} higher near the fish pens compared to 700 m away at the control (Fig. 3.1; $p = 0.0088$, Kruskal-Wallis). Average growth close to the pens was 0.98 cm · day^{-1} ± 0.03 (1 Standard Deviation) compared to 0.78 cm · day^{-1} ± 0.03 at the control site, a difference of 0.20 cm · day^{-1}. Distance also influenced growth when the data was compared on a finer scale of smaller distances around the farm.

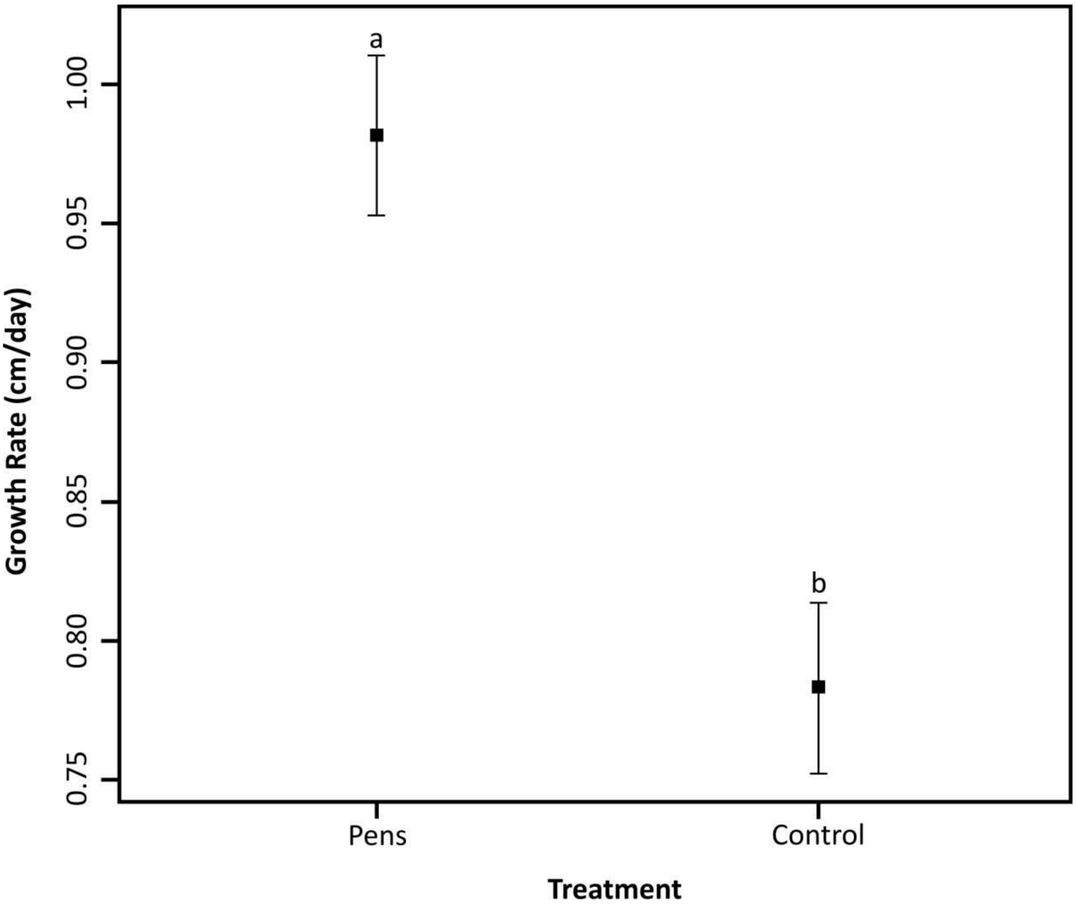


Figure 3.1: Mean growth of kelp grown at the Pens and Control sites. Bars represent one standard error and letters denote groups with means that are statistically similar ($p = 0.0088$, Kruskal-Wallis test).

This fine scale compared each line to the others and showed that there was no significant difference for any of the comparisons. However, when distances were grouped into categories based on similar growth rates seen in the plotted data, more informative and significant trends became apparent (Table 3.1, Fig. 3.2). Kelp grown closest to the pens had the lowest growth rate of 0.77 cm $\cdot$ day^{-1} ± 0.09, and was not significantly different from any other distance category. Growth from 8 to 24 m had the highest mean growth rate of 1.08 cm · day^{-1} ± 0.05, decreasing to 0.99 ± 0.03 from 32-64 m, 0.75 ± 0.03 at 120 m, and 0.78 cm · day^{-1} ± 0.03 at 700 m; which correspond to the Mid, Far, Distant, and Control categories, respectively (Table 3.1). Growth at the Mid and Far categories was significantly different from the Distant and Control categories ($p < 0.05$, ANOVA; Tukey). Visualizing growth rates in space showed a definite trend in growth over the farm site (Fig. 3.3). Contours interpolated from the measured values depict a pattern of highest growth in a ring from the west to the east/southeast and extending out towards the control. The highest rates of growth were found south of the pens. High growth rates followed known current patterns and low rates occurred in proximity to fresh water outlets.

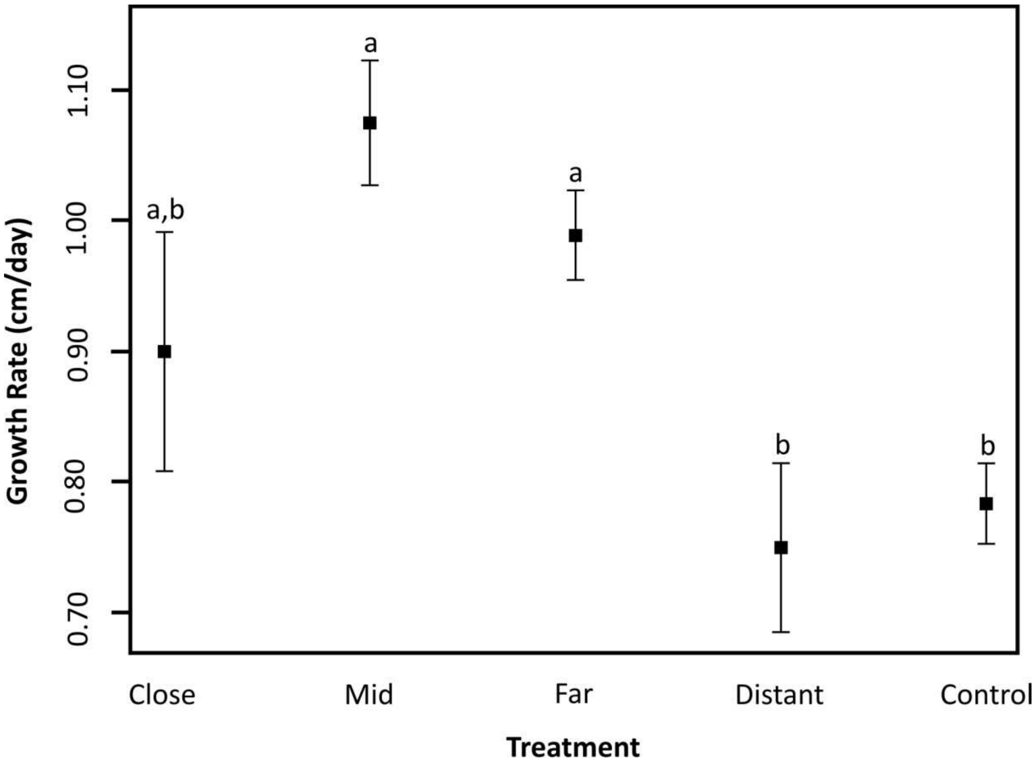


Figure 3.2: Mean growth rate of kelp grown at four different distance categories away from the pens: Close (1 m), Mid (8-24 m), Far (32-64 m), Distant (120 m), and Control (700 m). Bars represent one standard error and letters denote groups with means that are statistically similar ($p < 0.05$, ANOVA).

Table 3.1: Mean growth rates of kelps growing at the different distance categories. Statistical differences based on ANOVA and Tukey post-hoc test. Letters denote groups with means that are statistically similar.

Category	Distance from Pens (m)	Mean Growth (cm/day)	Statistical Grouping	Standard Error	Sample Size
Close	1	0.9	-	0.09	28
Mid	8-24	1.1	a	0.05	84
Far	32 - 64	1	a	0.03	125
Distant	120	0.8	b	0.06	22
Control	700	0.8	b	0.03	41

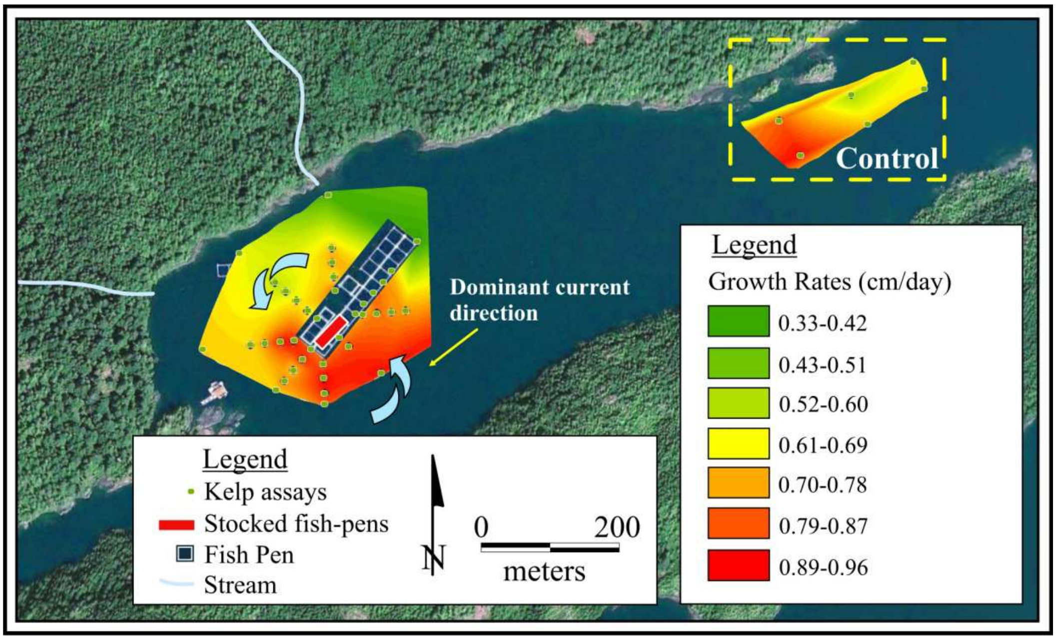


Figure 3.3: Map of the farm area depicting growth rates, and inferred growth rates/nutrient concentrations, of the kelp bioassays on a near (proximal to pens) and far (to the control station) scale.

3.2 Spatial Patterns-Depth Related

Depth was found to have a significant effect on growth rate, with values increasing with planting depth (Fig. 3.4, Table 3.2 ; $p < 0.0001$, Kruskal-Wallis). Slowest growth was at 2 m and averaged 0.7 cm · day^{-1} ± 0.02. Growth increased to 1.1 ± 0.04, 1.2 ± 0.05, and 2.2 ± 0.4 cm · day^{-1} at 4, 6, and 8 m respectively (Table 3.2).

Comparisons between all depths showed significantly different mean growth rates, except for between 4 and 6 m (Kruskal-Wallis multiple comparison test).

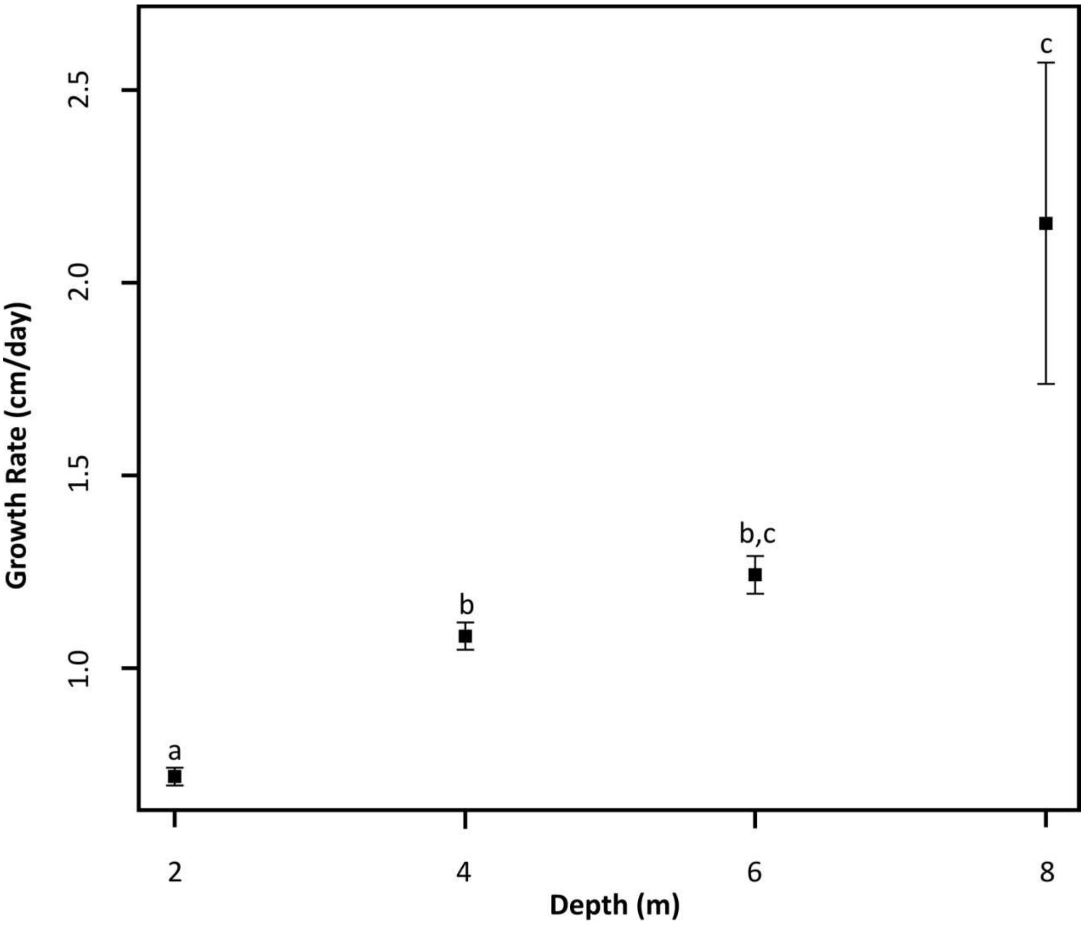


Figure 3.4: Mean growth of kelp at four different depths in meters. Bars represent one standard error and letters denote groups with means that are statistically similar ($p < 0.001$, Kruskal-Wallis test).

Table 3.2: Mean growth for different planting depths, statistical differences based on Kruskal-Wallis and Kruskal-Wallis multiple comparison test. Letters denote groups with means that are statistically similar.

Depth (m)	Mean Growth (cm/day)	Statistical Grouping	Standard Error	Sample Size
2	0.7	a	0.02	44
4	1.1	b,c	0.04	44
6	1.2	b	0.05	44
8	2.2	b	0.4	10

3.3 Seasonal Growth Patterns

Growth around the pens showed a definite seasonal trend, being highest in the early spring, increasing into early summer, and then decreasing through late summer (Fig. 3.5). Highest mean growth was recorded between June 7 and June 21 as 1.4 ± 0.05 cm · day^{-1}. This was 0.4 cm · day^{-1} higher than the average calculated over the field season (Table 3.3). Mean growth was not significantly different in spring and early summer between May 10 and June 21. The exception was June 7 and June 21, which were significantly different from one-another (Table 3.3; Kruskal-Wallis multiple comparison). Growth in this first part of the season was significantly higher than the last three dates on July 5, July 19, and Aug 3. The highest average growth rate in these later months was recorded on July 19 as 0.68 ± 0.02 cm · day^{-1}. Highest absolute daily growth was 2.0 cm · day^{-1} and occurred over the two weeks up to the June 21 sampling date. Lowest absolute daily growth was 0.4 cm · day^{-1}, occurring between July 5 and July 19. These results were visualized around the pens with interpolated contour plots, and re-iterate these seasonal growth changes (Table 3.4).

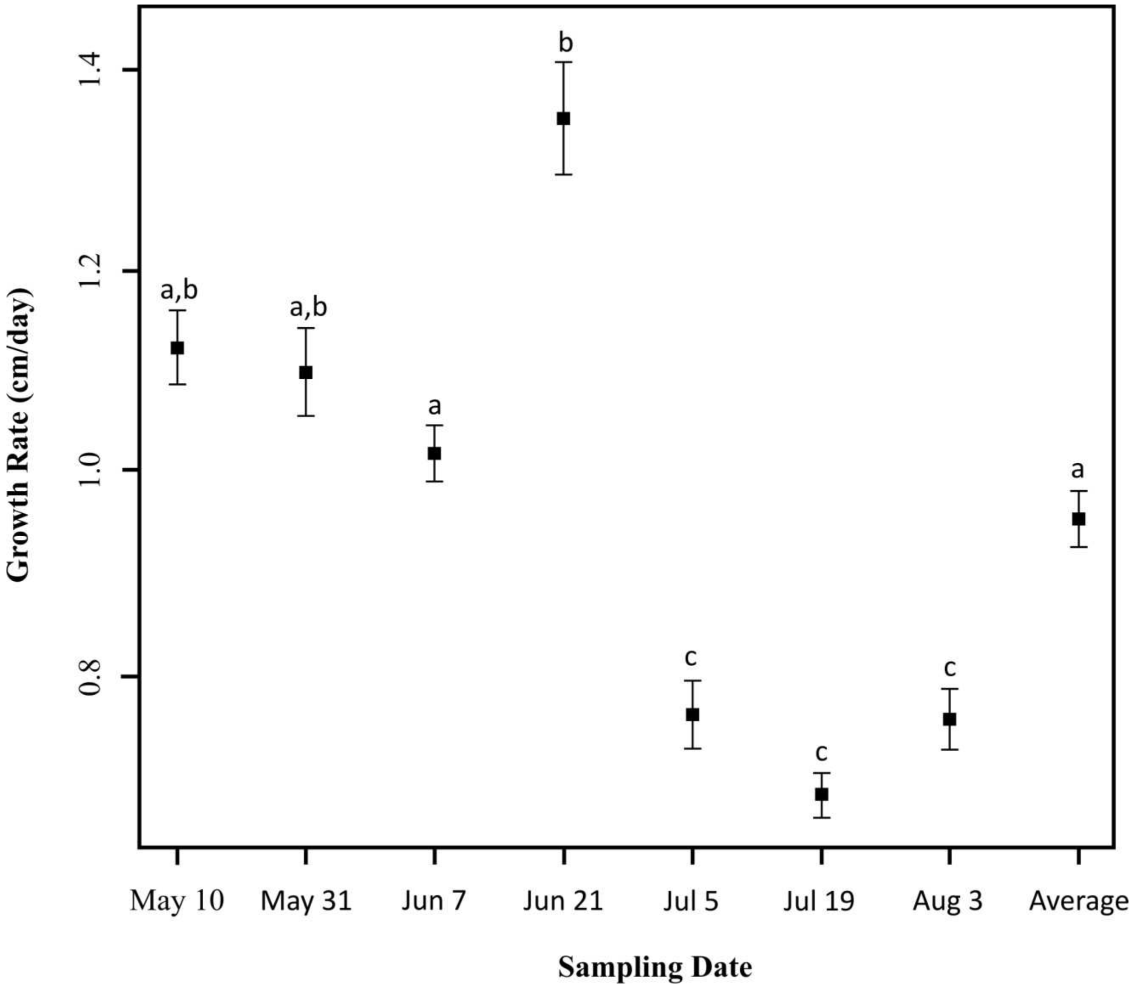
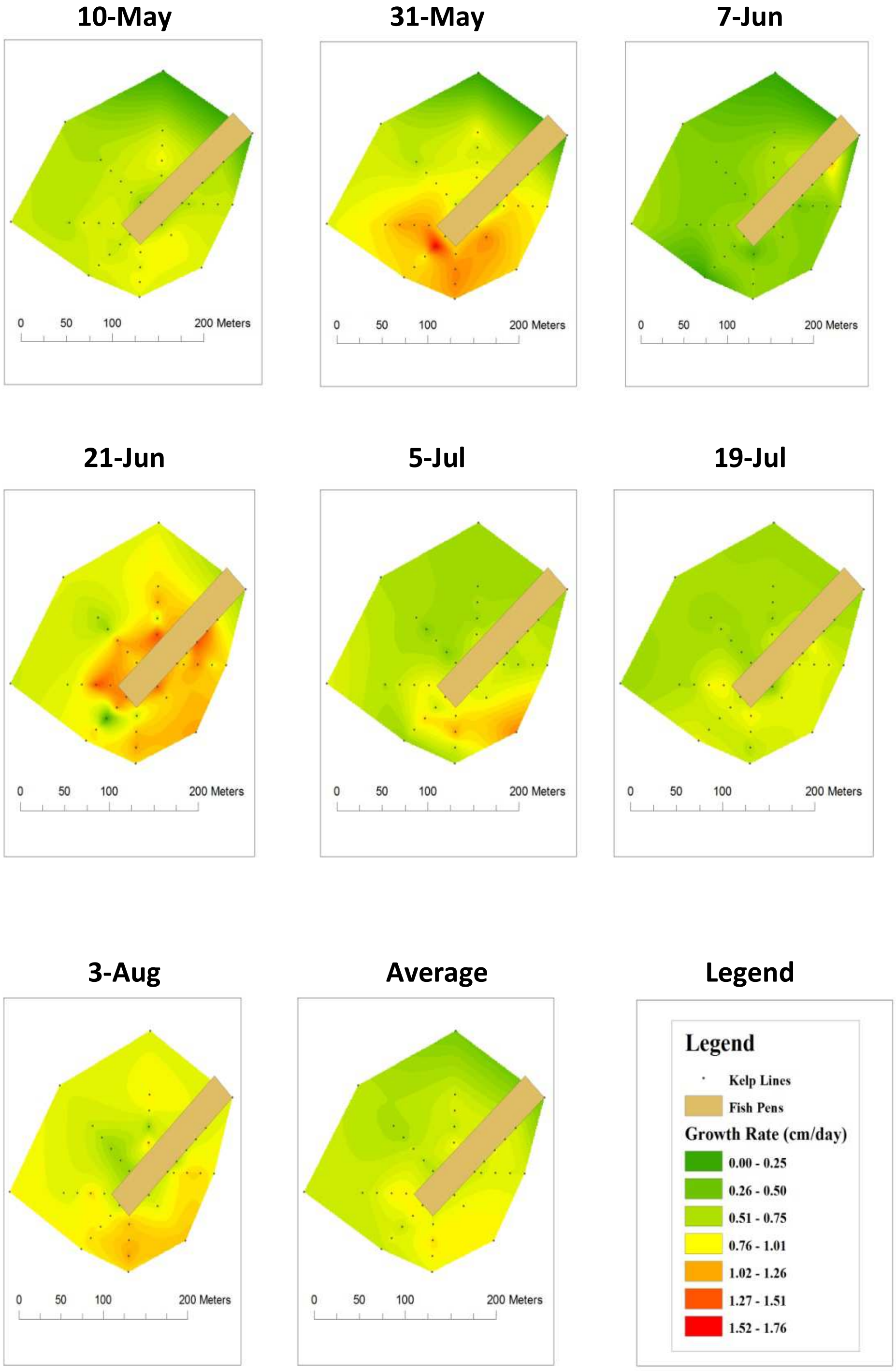


Figure 3.5: Average growth of kelp for seven sampling periods conducted at two-week intervals in 2010. Bars represent one standard error and letters denote groups with means that are statistically similar ($p < 0.001$, Kruskal-Wallis test).

Table 3.3: Kelp growth rates over the seven sampling periods, statistical differences based on Kruskal-Wallis and Kruskal-Wallis multiple comparison test. Letters denote groups with means that are statistically similar.

Date	Mean Growth (cm/day	Standard Error	Statistical Grouping	Sample Size
10-May	1.1	0.04	a,b	41
31-May	1.1	0.05	a,b	42
7-Jun	1	0.03	a	41
21-Jun	1.4	0.06	b	44
5-Jul	0.8	0.04	c	44
19-Jul	0.7	0.02	c	44
3-Aug	0.8	0.03	c	44
Average	1	0.03	a	

Table 3.4: Contour plots of the farm area depicting growth rates of the kelp bioassays over the seven sampling dates.



10-May

31-May

7-Jun

21-Jun

5-Jul

19-Jul

3-Aug

Average

Legend

Chapter 4: DISCUSSION

4.1 Spatial Patterns-Horizontal

The kelp bioassays were distributed at varying distances around the farm. It was found that those growing further away were less productive with lower growth rates. This was the case on both a large scale, when compared to a control station, and on a smaller scale around the fish pens. The control site was located 700 m away from the pens and kelp growing there had an average growth rate of 0.2 $cm \cdot day^{-1}$ less than plants growing near the pens. This trend was re-iterated on a more local scale around the pens over smaller distances.

Kelp growth rates were found to be directly proportional to distance from pens over a number of distance ranges. Kelp lines were set out around the fish pens at ten different distances approximately 8 m apart up to 120 m. The Near group was 1 m from the pens and included lines that were anchored to the pen system itself. From the literature it was expected that these lines would have the highest growth rates, but the opposite was found. This was likely a result of shading from the overhead walkways or some other factor such as slowed water flushing because the fish pens could impede currents. The Mid category was made up of distances from 8 – 24 m and showed the highest mean rate of growth of 1.1 $cm \cdot day^{-1}$. There was a decreasing trend in growth moving away from the pens to the Far (32 – 64 m), Distant (120 m), and Control (700 m) categories. Although growth did decrease moving away from the pens, it was only the

Mid to Distant/Control and Far to Distant/Control groups that were significantly different from one-another (Table 3.1; $p < 0.05$, ANOVA). These results agree with those found in a number of similar studies.

Thin bladed *Ulva* grown around Mediterranean fish farms had higher growth closer to fish pens over a number of different distances (Dalsgaard and Krause-Jensen 2006). Another experiment, conducted at a Chilean Salmon farm, found *Gracilaria chilensis* grew up to 40 percent more quickly when cultivated 10 m from the pens compared to 150 m and 1000 m away (Troell *et al.* 1997). A third experiment looked at proximity to a sewage outfall and found this same trend with growth of *Ulva* (Lyngby and Mortensen 1994). All of these found that a point source of nutrients caused an increase in growth. Although these studies cite specific values for growth, the different methods of measurement used make it difficult to make direct comparisons to our results.

In our study, growth was measured using the hole-punch technique, which gave values of cm of growth over a two-week interval (Parke 1948). To compare our results to those of other studies it was helpful to look at percent changes in growth. The largest difference was seen in the Mid kelp lines, which grew 37 percent more quickly compared to the Distant lines ($p = 0.004$, ANOVA). This is very similar to the value of 40 percent cited by (Troell *et al.* 1997) for growth of *G. chilensis* around Salmon pens. Dalsgaard and Krause-Jensen (2006) reported even higher values of up to 96 percent when grown 8 m from fish pens compared to a control station. Our results add to the body of knowledge on the effect of distance from a nutrient point source on seaweed growth. They re-iterate the results of other work and confirm the input of a growth limiting factor from the fish pens.

The above trends are a result of nutrient limitation and a subsidy of one or more of these nutrients from farm operations. We have assumed that a number of abiotic factors affecting seaweed growth were constant around the farm site. These included irradiance, background nutrient concentrations, water temperature, and salinity. Although none of these factors were measured directly, our study was conducted on a that they were identical between kelp lines. Two stream outlets approximately 140 m away from the farm-altered salinity in their direct vicinity. These streams lowered the salinity in their direct vicinity and potentially brought land-derived nutrients as run-off. Resources were not available to directly measure this. The closest kelp growing to these was 20 m away and included lines in the Distant category (120 m from pens). This group grew significantly more slowly than Mid and Far kelp lines with the lowest mean growth of 0.75 cm·day^{-1}. This is also seen visually in the contour plot of growth, which shows areas of low growth for the lines in this category (Fig. 3.2). This could indicate that the fresh-water intrusions were affecting growth, or some other factor related to proximity to stream/shore.

These assumptions narrow the causative factor to nutrient concentration, or some other un-thought-of condition. This is reasonable, as seasonal nutrient limitation is well established for marine waters, with lowest concentrations occurring over the time frame of this study (Luning 1993). The nutrient subsidy from the farm increases concentrations of these limiting nutrients and could allow growth to increase as a result.

For instance, nitrogen was found to be the main limiting factor for summer growth of the Kelp *Laminaria longicruiris* on the Nova Scotia coast (Chapman and Craigie 1977). In this way, changes in growth rate can provide an indication of nutrient enrichment and relative nutrient concentrations. This provides a method of nutrient monitoring, but cannot be used to predict specific dissolved concentrations.

Although nutrient type and concentration cannot be inferred from this study, it is likely that ammonium nitrogen is the leading cause of these growth changes. In coastal marine waters, nitrogen is the critical nutrient that limits algal growth and eutrophication (Ryther and Dunstan 1971). This is because phosphorus is usually present at twice the concentration that can be used by algae due to enriched terrestrial run-off. Nutrient release varies between species of fish, but nitrogen is typically eliminated as ammonium, nitrate, nitrite and urea (Qian *et al.* 2001). In Atlantic Salmon, the greatest proportion of this occurs as ammonium (61 – 67%) and urea (7 – 10%) (Fivelstad *et al.* 1990). Although similar data are not available for Sable fish, they may follow a similar trend of nutrient release. Changes in ambient levels of these two nutrients can be significant around fish farms. Water sampling has shown that dissolved concentrations can reach a noontime peak of seven times the early morning levels (Karakassis *et al.* 2001). This means that there is a pool of available nitrogen compounds useable by seaweeds around the fish pens. It implies also that the growth differences observed in our experiment were likely a result of ammonium enrichment, with other compounds contributing to a lesser extent. Although these nutrients are being released into the water column, they must be brought into proximity of the seaweeds to become useable.

Similar work has been done with a variety of kelp species in the same family *S. latissima*. This study cultivated a number of species on long-lines and measured growth in response to measured nutrient concentrations in the water column (Druehl *et al.*, 1988). They found that growth increased significantly in relation to nitrogen levels and found a direct correlation between the two. This shows that nitrogen may be a causative factor creating the patterns in growth found around this IMTA farm. It also corroborates the argument made here that kelp growth rates may mirror, and therefore provide a good indicator, of background nitrogen concentrations and therefore loading.

Currents play a large role in nutrient cycling around fish farms, and can explain the spatial patterns in growth of the kelp lines in our study. Although direct measurements of current were not made, the pattern of growth illustrated in the contour plots follow the known dominant current direction (Fig. 3.2). This figure shows growth rates as being highest in the Southern portion of the pens and extending east approximately 700 m to the start of the control station. This pattern mirrors known current movements for this enclosed bay. Although values in-between the pens and control are rough estimates, the contours do give an indication of the movement of the plume and the extent to which it can travel from a point source.

Another possible reason for this pattern is high growth at the control for some unknown reason. This would create the extended contour of the plume seen (from pens to control) as values were estimated from points at the edge of the pens to the edge of the control. This figure was generated from data collected from eight transects extending outwards from the pens in the eight cardinal directions, each with either four or eight floats spaced 16 m apart. Contours were estimated using interpolation to find values in between the measured points and give a broad indication of growth in the bay. These estimates become less reliable the further the data points are from one another, and so are more precise closer to the pens where the floats are more concentrated. Least accurate estimates are those between the pens and control, where the distance between measurements is large. Using GIS in this application is a simple way of visualizing relative nutrient concentrations around a point source and informing decisions on kelp sitting.

GIS can be a powerful way of presenting data because it gives a visual presentation of potentially complex trends. One of the simplest ways of using a GIS is to portray georeferenced data in a visual manner. Like a graph, it visually summarizes data and allows trends to be easily seen. Applications can also be more complex, for instance incorporating depositional models for predicting waste dispersal around a fish farm (Pérez *et al.* 2002). We used a GIS to generate a contour plot of growth rates around the farm. These types of plots could be used to inform farms on where nutrients are being distributed and where best to plant kelp lines around fish pens. Similar uses have helped identify optimal sites for new aquaculture operations, such as Salmon and Catfish (Ross *et al.* 1993; Kapetsky *et al.* 1988).

The general trend of increasing growth with proximity to the pens can be applied to other farm sites, but the specific results of distance affects are site-specific. The distance-study of (Dalsgaard and Krause-Jensen 2006) was conducted at three different farms. Although they had similar growth trends, there was a high degree of variability in specific distance effects. For instance, between 10 and 65 m away from the pens at one site they found no statistically significant difference in growth, while at another site there was a difference over a similar distance range. This variability is also seen when compared to our study, where there was no difference in growth in going from 8 and 24 m. These results show the importance of conducting preliminary investigations into the extent of the nutrient plume when deciding how best to site seaweed lines around a farm.

Although the differences in growth seem small, they can have a significant impact on farm management in the long term. The greatest difference in growth was 0.3 $\mathrm{cm \cdot day^{-1}}$ and occurred between Mid and Distant/Control plants. If this improvement in growth is extrapolated over the four-month period of this study it shows that cultivating kelp close to the pens can lead to an improvement of 36 cm in growth per plant. This translates into higher yields and profits for the farm and greater potential for environmental remediation.

Most studies of this type rely on water sampling to monitor nutrient status, a method that is inherently prone to time-related error. Water sampling provides a snapshot of water conditions in time and space because particles diffuse naturally and are moved by currents. In addition to this, nutrient releases from fish are not constant, but vary over the course of a day. Spot sampling, therefore, can lead to biased results depending on the time and location of sampling. Solutions to this have included consecutive sampling with a high number of samples and use of in-situ probes with data loggers (López *et al.* 2009). The method used in our study provides a time-integrated approach because the seaweed is constantly absorbing nutrients and can take advantage of the periodic nutrient bursts. Use of a seaweed bioassay is a simple and inexpensive means of achieving a less biased result, and represents an alternative to labour intensive and costly water sampling. One limitation to kelp bioassays is their inability to make direct predictions of dissolved nutrient concentrations.

4.2 Spatial Patterns-Depth Related

Planting depth was found to have a significant impact on growth rates. The deeper the plants were cultivated the higher the rates of growth. For each bioassay, Kelp was grown at four different depths (2, 4, 6, and 8 m). The highest measured growth rate was 2.2 cm · day^{-1} at 8 m and decreased to 0.7 cm · day^{-1} at 2m. Rates were significantly different between all depths except 4 – 6 m and 6 – 8 m. A number of environmental differences between these depths could account for this.

Temperature, salinity, and light all affect the growth of seaweeds and can vary with depth. With *Laminaria saccharina*, high temperatures decrease growth rates, while high salinity and light both improve growth (Gerard *et al.* 1987). In general, deeper waters tend to be characterized by good growing conditions, having lower temperatures, higher salinity, and lower irradiance compared to surface waters. Surprise Island is located in a wet region with many rainy days and the pens are within approximately 300m of two small creek outlets. These are sources of freshwater that create a freshwater lens in the surface waters. Although no water parameters were directly measured for the site, it is likely that temperature and irradiance followed known trends and that there existed a vertical salinity gradient. Our results coincide with the literature descriptions of depth dependent growth, except for light, which should be limiting at lower depths. One explanation is that over this depth range photosynthesis is light saturated, and it is only in going deeper that irradiance has a large effect (Luning 1979). It is also possible that some other, unaccounted for factor is playing a role, perhaps local currents or nutrient cycling dynamics of the bay.

Growth can also be indirectly affected by depth through changes in nutrient uptake. In the kelp *Macrocystis pyrifera*, it was found that plants incubated in surface waters had higher uptake rates than those grown at 10 – 12 m depth (Gerard 1982). This study found that light had a significant impact on this, while temperature differences and ambient nutrient concentrations were not different between the depths. For an IMTA system wanting to maximize nutrient uptake, it could be optimal to plant in the surface waters were uptake rates are fastest.

The depth-dependent results we found are important for farm management planning because it indicates that planting depth is significant and, from these limited results, 8 m seems optimal. Further work should investigate deeper planting depths.

4.3 Seasonal Growth Patterns

In general, seaweed growth is stimulated in the winter, remains high through the spring and declines into the summer months (Klaus Luning 1993). This is the exact trend that we found in the kelps growing around the fish pens in our study; although our study period was limited from early spring (May) to late summer (August) (Fig. 3.4). Average growth reached a peak of 1.4 cm · day^{-1} between June 7 and June 21. This period also had the highest measured, individual growth rate of 2.0 cm · day^{-1}. This high spring growth was followed by a low of 0.7 – 0.8 cm · day^{-1} in the summer (July – August), with lowest measured growth of 0.4 cm · day^{-1}. The same trend has been observed by a number of other researchers for the same and closely related kelp species. For instance, Parke (1948) found that growth of *Laminaria saccharina* (previous name given to *Saccharina latissima*) in a sheltered bay in England at similar latitude (56.2° N - Argyll versus 50.0° N – Kyuquot Sound) reached a maximum of 1.6 cm · day^{-1} in the spring from the start of May until the end of June. This rate declined to approximately 0.7 cm · day^{-1} in July and August and reached a minimum in November. These values are almost identical to those we observed for the similar time periods, and suggest similar trends in growth conditions between these far removed sites. Other, similar results were found for *L. longicruiris* and *Macrocystis integrifolia* on the East and West coasts of Canada, respectively (Chapman and Craigie 1977; Wheeler and Druehl 1986).

Seasonal growth in seaweeds follows natural cycles of abiotic conditions that impact their growth. For instance, factors such as dissolved nutrient concentration, light, and temperature are all cyclical and are essential for growth (Klaus Luning 1993).

These cycles follow winter-summer trends with high nutrient concentrations in the winter months and low light and temperatures. It is thought that an exogenous, circa-annual rhythm has developed in response to these fluctuating conditions.

For seaweeds, slowing growth in the summer is thought to have an evolutionary benefit of prolonging growth through the winter months. During the summer when light is in abundance, new growth tends to slow to allow fixed carbon to be redirected to storage (Klaus Luning 1993). These stores can then be used in the low-light winter months for new growth, allowing nutrient abundances to be taken advantage of. Fish farms represent a means of prolonging growth through the period of low summer activity by providing a nutrient subsidy.

Growth during the summer months has been found to be stimulated by addition of nitrate, one of the nutrients added by fish farms. Chapman and Craigie (1977) measured the growth of *L. groenlandica* (a closely related species) and found values similar to the rates of growth in our study, but with summer growth being much lower than ours (Table 3.3). They found that by fertilizing with nitrate in the summer months growth was stimulated, and elevated to the rates we observed around the fish pens. This suggests that nutrient additions from the fish could be causing improved, and prolonged growth. These results are variable though, as Parke (1948) found summer growth in *L. saccharinca* closer to ours, ranging from approximately 0.5 – 0.7 cm · day^{-1} in summer months in a sheltered bay. This shows the variability between sites and possibly species, and demonstrates that specific results can be quite variable. Saying this, the results of the nutrient addition experiment of Chapman and Craigie (1977) do show that a nutrient subsidy in the summer months will prolong high growth rates and reinforces the benefits of IMTA to kelp farmers and fish farmers.

4.4 Benefits of Approach

This approach provided an inexpensive means of monitoring for nutrient wastes and hypernutrification in an aquatic environment. It contrasts with more expensive methods of water quality sampling and gives a time-integrated approach that reduces errors arising from the pulsed nature of nutrient fluxes in a tidal-affected bay.

4.5 Limitations in Data/Results

One of the largest limitations of the results we can infer from this study comes from the lack of abiotic data collected. Without this, we cannot definitively say that differences in growth rates were due to varying levels of dissolved nutrients. Stream outlets could have lowered growth by reducing salinity. A vertical salinity gradient could have affected growth at different water depths. Irradiance levels at different depths could have been the driving cause of depth dependent growth. A number of kelp lines were also tied directly onto the dock system. This could not be avoided and meant that the kelp at these locations was exposed to greater periods of shade from the overhead walkways, which could have decreased growth. Although the control was 700 m away from the pens, it is possible that this was still close enough to detect a nutrient signal from the fish pens. Due to licensing constrains, the control assays could not be put out at a further distance than this. As this was used only to generalize about farm versus non-farm growth, the other analyses would not have been affected by this.

Chapter 5: CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

Aquaculture in British Columbia has received a high amount of media and NGO attention for its perceived negative effects on both local and removed ecosystems. These concerns include fish feed composition, fish wastes released from farms (i.e. uneaten food and feces), escapes into the wild, parasites and diseases, use of chemotherapeutants, marine mammal entanglement in nets, anti-fouling paints on nets and negative aesthetic effects. In British Columbia, the salmon farming industry has been a particular focus of this attention, but these concerns are alos experienced with regards to other types of finfish aquaculture. For both environmental and economic sustainability of the industry these issues need to be addressed.

One approach to addressing many of these issues is the development of Integrated Multi-Trophic Aquaculture (IMTA), which focuses on the environmental impacts of the farms. IMTA incorporates traditional fed aquaculture (i.e. finfish) with the culture of other species that are capable of extracting the particulate and dissolved wastes released by the fish. Filter feeders such as mussels and scallops remove large particles such as feces and uneaten food, while kelps and seaweeds absorb the dissolved nutrients released when the feces and food break down further. Any combination of at least one organism from each of these groups is cultured in close proximity to one-another on the same farm. This creates a simple ecosystem capable of recycling the wastes generated. This system also has economic benefits for the farm because the secondary species are all chosen for both their marketability and remediation potential. Farm products are diversified and the social acceptability of aquaculture farms could be increased with the reduced environmental impacts.

Water quality around fish farms is typically measured by analyzing samples of collected water for nutrient concentrations. This technique is costly, requiring expensive laboratory analysis. It can also be potentially misleading due to the nature of nutrient release and tidal cycles. Nutrients are released from fish farms in pulses correlated to feeding regime. Released particles and dissolved components can be carried rapidly away from the fish pens by changing ocean currents. These two factors make it difficult to be sure that the water sample collected at a specific location and time are accurate representations of the water column as a whole. The use of an in-situ biomonitor is a cost-effective solution to this technique that eliminates the uncertainty of rapid nutrient fluxes.

Kelps make an effective biomonitor because they constantly absorb nutrients from the water column and reflect ambient nutrient concentrations in their rate of growth. The rate of blade elongation increases when nutrients are more abundant and this gives an easy way of measuring relative availability of nutrients between individuals. Use of a kelp grown in the water column around the fish pens provides a time-integrated means of cheaply monitoring for relative nutrient loading, and solves the problem of time sensitivity of the traditional water sampling method. One drawback is that it is complicated to make direct inference to specific nutrient concentrations in the water. This used an in-situ kelp bioassays installed around an IMTA farm to answer a number of basic and applied questions:

1) What is the extent and spatial distribution of nutrient wastes released from the fish pens of an active fish farm into the surrounding waters?

2) Can kelp be used as an inexpensive means of biomonitoring for hypernutrification in a marine environment?

3) What are the optimal planting locations for kelp at this farm site to optimize nutrient removal and bioremediation potential?

4) What is the optimal planting depth and harvest time to maximize growth rate and production of the kelp crop?

5) What is the seasonal growth cycle of *S. latissima* and does growth proximal to a nutrient subsidy alter this compared to wild populations as described in the literature?

5.2 Summary of Findings

1) What is the extent and spatial distribution of nutrient wastes around the fish pens of this farm site?

Results from this study show that kelp growth varied significantly around the farm site. These differences were attributed to varying concentrations of dissolved nutrients in the water column. Most other abiotic factors effecting growth were assumed to be constant. Ideally these would have been measured as well, but due to time and budgetary constraints this was not possible. Because of the relatively small spatial scale of the study site these assumptions were deemed appropriate for conditions such as irradiance and temperature. Salinity on the other hand may have been different because of two streams that run into the bay. Because kelp growth is sensitive to salinity, these streams may have affected our results. To account for this, we planted three bioassays near the outlets 120 m away from the pens. These grew significantly more slowly than the ones close to the pens and growth rate averaged 0.8 $cm \cdot day^{-1}$. However, they did grow more quickly than those at the control 700m away, although not significantly so. This shows that there could likely have been a fresh water effect adjacent to the streams, but this effect rapidly diminished with distance for the next closest lines 56 m away. If we accept that, on average, conditions were similar around the site, then the differences in growth rates around the farm show the distribution of dissolved nutrient concentrations.

Another factor that we did not have the means to make detailed measurements of was current. This is a critical factor affecting the distribution of nutrients in the water column because it is water motion that moves the dissolved particles around the site. The dominant current directions are known from previous work. However, having a detailed map of current dynamics around the site could have helped explain the differences in growth rates and inferred nutrient concentrations measured around the farm.

We found distinct spatial patterns in growth rates around the farm site on both a large scale and a more local one. The highest average growth was 0.98 $cm \cdot day^{-1}$ and occurred from 1 m to 120 m from the pens. This was significantly higher than growth 700 m away at the control, which was on average 0.78 $cm \cdot day^{-1}$ over the period of this study. This shows that the nutrient plume emanating from the farm disperses over the distance reaching to the control. Although 700 m was large enough to show a difference in growth, including a control that was even further away would have been useful. As shown in the contour plot of growth in Fig. 3.3 there was a spike in average growth at the edge of the control, which could be depicting the outer edge of the nutrient plume. By including a more distant control we would be able to determine if the nutrient plume is still affecting growth 700 m from the pens. Growth was also compared on a small scale between individual bioassays and showed significant differences around the pens.

In general, the nutrient plume is localized to a region extending east from the pens and then wrapping around south and to the west (Fig. 3.3). Growth rates were highest 8 m to 64 m from the edge of the stocked fish pens, were slightly lower 1 m from the pens and were the lowest 120 m and 700 m away (Fig. 3.2). The highest mean growth rate was 1.1 cm · day^{-1} and occurred from 8 m to 24 m from the pens. We expected growth to be the highest close to the pens and attribute low rates at the 1 m distance to shading from the overhead walkways. This was because bioassays had to be tied onto the walkways at this distance, which extended 1m away from the edge of the fish enclosure net. Measuring irradiance for this assays could have shown if the was the true.

Our results showed that there was a complex pattern of nutrient dispersal occurring around the fish pens and that growth was being affected by the spatial distribution of the plume. The movement and distribution of nutrients occurred via currents and tidal changes. In further work, detailed mapping of current patterns over an extended period would likely show a strong correlation to the pattern of nutrient dispersal. This would be a critical component that could explain why the nutrients are moving in the observed way.

2) Can kelp be used as an inexpensive means of biomonitoring for hypernutrification in a marine environment?

This study used simple infrastructure to construct biomonitors from a locally found kelp species that were capable of effectively revealing relative concentrations of nutrients in a body of water. The cost to construct the bioassays is low because the materials used are easily found at local marine and hardware stores. Their simple design means quick construction and easy deployment and monitoring (Fig. 2.3). The only specialized equipment needed is that involved in kelp stock culturing, and this requires only fish tanks and grow lights. The time required depends on the type of study being completed and questions being addressed, but can be as short as five months. A potential time-line could be as follows: January seeding the kelp spores for growth to gametophyte stage, March out-planting of bioassays into experimental array, May field sampling for up to four trips (minimum two) and finally site clean up at the end of May. This would likely give a large enough sample size to make accurate conclusions about the extent and patterns of a nutrient plume.

One draw back to this method is that it cannot infer exact nutrient concentrations in the water, only relative concentrations compared to other bioassays grown in the same region. For environmental monitoring efforts with the aim of compliance with government set guidelines this is a problem. One solution could be to incorporate a control station that is known to have ‘normal’ or low nutrient levels as a baseline. Another could use historical growth-rate data of kelps in the region as a comparison. Others have attempted to correlate tissue-nutrient concentrations with external concentrations, but this involves previous knowledge of species-specific physiology and is reliant on chemical analysis. Although an assay program like this cannot predict exact levels of nutrient levels, it does provide a cost-effective means of monitoring for higher than normal rates of growth and can indicate regions of hypernutrification.

3) What are the optimal planting locations for kelp at this farm site to optimize nutrient removal and bioremediation potential?

One of the practical applications of this study is its ability to make recommendations to farm managers on planting strategies that would optimize nutrient removal in an IMTA system. The output of the simple contour plot of growth rates depicted in Fig. 3.3 is sufficient to inform farmers on where the nutrient plume is most concentrated. With this information, ideal planting locations are evident and the results are simple to apply.

For this farm site the nutrient plume was definitely localized in a band to the south of the pens extending from east to west (Fig. 3.3). To optimize nutrient removal and productivity, the kelp should be planted in this region where exposure to dissolved nutrients is maximized. This contrasts with current practices on the farm, which cultivates its kelp crop to the north of the pens in lines extending northwest. This project shows that this is a region of slowest growth. The crop would benefit greatly if relocated to the south of the pens. Unfortunately, at this site the southern area is the main thoroughfare for boats and is also needed for fish harvesting at the farm.

4) What is the optimal planting depth and harvest time for optimal growth rate and production of the kelp crop?

Growth follows trends with both planting depth and seasonal that should be taken into account when making a farm plan for IMTA operations. Our study measured depth dependence of growth from 2 m to 8 m and found that it was highest in the deeper waters (Fig. 3.4). For instance, growth was significantly lower at 2 m with a mean of 0.7 cm · day^{-1} compared to 1.2 cm · day^{-1} at 6 m. The highest growth rates by far were at 8 m, which averaged 2.2 cm · day^{-1}. This shows that 8 m is an optimal planting depth out of the four depths measured. The farm currently cultivates its kelp crop at 4 m (mean of 1.1 cm · day^{-1}) and could see an increase in productivity by up to 100% if planted at 8 m. This depth was only measured for a small number of replicates though and reflects this in a standard error of up to 20 times that of the other depth treatments. This means that our measurements of growth at 8 m were quite variable and further work should include a larger number of replicates. Including treatments below 8 m would also be interesting and would indicate the lowest productive depth around this farm site.

Data were collected from May until the end of August. Over this time there was a noticeable seasonal trend in growth. Growth was highest from May until mid June, reaching a maximum of 1.4 cm · day^{-1} on June 21st (Fig. 3.5). It quickly dropped off after this for July into early August. From a farm management point of view, it would be best to harvest the crop around mid July when growth begins to decline. This should be done promptly and not left until the fall because of extensive epiphyte growth. From personal observations throughout the course of the field season, both epiphytes and herbivores (i.e. Turbin Snails) became more abundant throughout the summer. By harvesting quickly, these will be given less time to establish and thereby increase the marketability of the crop.

5) What is the seasonal growth cycle of *L. saccharina* and does growth proximal to a nutrient subsidy alter this compared to wild populations as described in the literature?

All kelps follow a seasonal pattern of growth that correlates with light, nutrient and temperature conditions. In the winter and spring in the latitudes of this study (50.0° N) growth increases in the winter months and remains high into the spring and early summer (i.e. approximately January through to June). While summer growth is slowed, and declines in relation to low nutrient availability in the water (Klaus Luning 1993). This was the same trend observed in our results. There was the possibility that a nutrient subsidy from the fish farm would prolong growth in accordance with the nutrient addition trials of Chapman and Craigie (1977). On this point results were mixed as summer growth rates reported by Parke (1948) closely matched our summer growth but rates measured by Chapman and Craigie (1977) were much lower (by 0.3 cm · day^{-1}). This shows the great variability involved in research like this where there are many factors that differ between studies. For instance, environmental differences can be large between sites, which can have vastly different levels of irradiance, nutrient concentrations and temperature. Genotype can also play a role. Although closely related species will behave in similar ways, there could still be differences that are hard to control for. In the end, our results showed that there is a good chance that growth is prolonged later into the season by a nutrient subsidy from the fish farm. To corroborate this, it would be necessary to repeat this study with the same bioassay grown in different areas without any near-by source of nutrients.

5.3 Research Contributions

This work has built on the findings of Dalsgaard and Krause-Jensen (2006) and others that a nutrient subsidy can be detected by *in-situ* biomonitors. It re-iterates the fundamental principles of nutrient extraction of IMTA systems. One of the largest potential sources of error of this experiment was in the assumptions made about abiotic conditions. Time and resource limitations made it infeasible for measurements of current, salinity, light, and water temperature to be made. Current measurements had been made in the past and were generally understood for the bay. We assumed little variability in these other parameters in the sheltered bay in which this study was conducted because of the relatively small scale (up to 1 km) over which assays were deployed. Our results only give an indication of relative nutrient concentration if all other growth-limiting factors are the same between assays. Growth North of the pens was the lowest but also corresponded to locations of stream-outlets. Because fresh-water is not conducive to kelp growth it is highly likely that the streams played a role in these lower rates of growth as opposed to lower nutrient concentrations in these regions. Future work should consider these other factors and collect data that could, with high confidence, narrow the causative factor to a difference solely in nutrient concentration.

Farm-related recommendations of this research inform ideal planting locations of kelp at this site. Optimal growth and nutrient sequestration will be achieved if kelp lines are placed south of the pens and grown at two depths between 6 and 8 m. This corresponds to the region of potentially highest nutrient concentration, and which is where growth rates were highest. Although these results are site specific there are some general trends that can be applied to any farm using kelp as a nutrient scrubber, or project using it in biomonitoring. Planting at multiple depths would allow a larger piece of the water column to be scrubbed of nutrients, and could improve uptake efficiency because currents constantly cause nutrients to be in flux. To maximize amount of nutrients sequestered it would be prudent to leave some plants at harvest to grow through the winter months. One of the results of this study was that growth was prolonged through the season, potentially due to nutrient subsidies from the farm. This means that growth, and uptake, will continue through the fall and winter and will provide a continual pump for nutrient wastes. This would contrast with current practices that remove all kelp at harvest for sale to market. Leaving plants would reduce profit, but if maximizing nutrient uptake is a priority then a loss in profit could be justified.

Future work could compare traditional methods of water quality monitoring to the methods used here. This would give an indication of how accurately a kelp assay such as this is at indicating dissolved nutrient concentrations. Taking measurements of other abiotic conditions such as detailed irradiance levels, salinity profiles and temperature profiles around the farm would greatly improve the confidence in concluding that the observed growth differences were due to varying nutrient concentrations.

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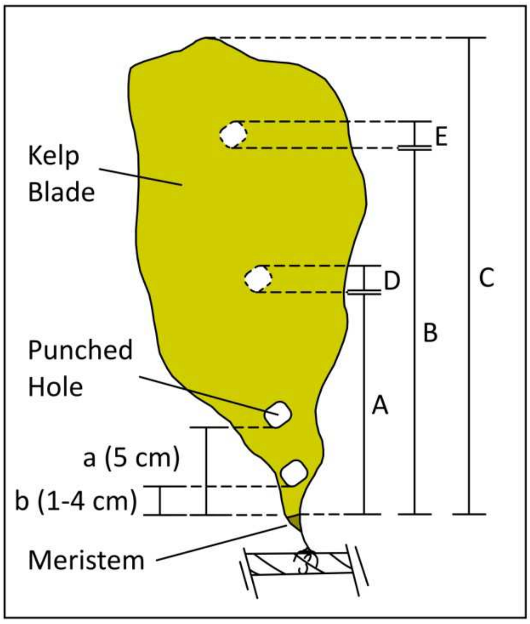
APPENDIX



Appendix Figure 1: Diagram of kelp blade showing the five measurements taken (A, B, C, D, & E) and presented in the data tables that follow. Holes were punched at variable distances for hole "b" to determine extent of meristem.

Appendix Table 1: Data collected from May 9/2012 to August 3/2012. The first column contains the dates on which the holes were punched and the second the dates on which measurements were made (“Hole punched” and “Data collected”, respectively). The third and fourth columns under the heading “Punch (cm)” (“ a” and “ b”) describe the two holes punched and the distance they were punched from the meristematic region, in cm. The fourth column is the depth at which the blades were grown. The last five columns under the heading “Measurement (cm)” are the measurements made on each blade in cm and depicted in Appendix Figure 1.

Dates		Punch (cm)		Depth (m)	Measurement (cm)				
Hole-punched	Data collected	a	b		A	B	C	D	E
May 3/2010	May 9/2010	1	5	2	3.2	8.8	16.4	1.2	0.6
May 3/2010	May 9/2010	1	5	2	4.1	10.4	19.2	1.5	0.6
May 3/2010	May 9/2010	1	5	4	4.6	10.7	18.7	1.2	0.5
May 3/2010	May 9/2010	1	5	4	4.2	9.8	14.5	1.0	0.5
May 3/2010	May 9/2010	1	5	6	4.0	8.9	14.8	1.2	0.6
May 3/2010	May 9/2010	1	5	6	3.3	8.7	16.0	1.2	0.6
May 3/2010	May 9/2010	1	5	2	4.5	11.2	31.5	1.5	0.6
May 3/2010	May 9/2010	1	5	2	4.7	11.4	26.1	1.7	0.6
May 3/2010	May 9/2010	1	5	4	4.9	12.1	21.1	1.8	0.6
May 3/2010	May 9/2010	1	5	4	6.0	12.3	24.4	1.5	0.6
May 3/2010	May 9/2010	1	5	6	4.1	9.8	16.3	1.9	0.5
May 3/2010	May 9/2010	1	5	6	4.1	10.0	16.3	1.4	0.5
May 3/2010	May 9/2010	1	5	2	3.9	10.4	21.9	1.5	0.5

May 3/2010	May 9/2010	1	5	2	5.3	11.6	19.7	1.5	0.6
May 3/2010	May 9/2010	1	5	4	4.2	11.1	16.7	1.6	0.5
May 3/2010	May 9/2010	1	5	4	5.6	10.7	16.6	1.5	0.5
May 3/2010	May 9/2010	1	5	6	4.2	11.6	22.2	1.5	0.5
May 3/2010	May 9/2010	1	5	6	3.7	10.3	14.4	1.3	0.6
May 3/2010	May 9/2010	1	5	2	3.3	9.8	23.7	1.4	0.6
May 3/2010	May 9/2010	1	5	2	4.3	12.1	31.3	1.5	0.6
May 3/2010	May 9/2010	1	5	4	5.3	9.9	14.3	1.0	0.5
May 3/2010	May 9/2010	1	5	4	4.3	10.3	13.3	1.1	0.5
May 3/2010	May 9/2010	1	5	6	4.6	11.8	18.6	1.6	0.5
May 3/2010	May 9/2010	1	5	6	5.6	11.0	13.6	1.3	0.6
May 3/2010	May 9/2010	1	5	2	3.8	8.7	13.0	0.9	0.5
May 3/2010	May 9/2010	1	5	2	4.6	10.8	19.6	NA	NA
May 3/2010	May 9/2010	1	5	4	5.1	12.2	28.6	1.9	0.6
May 3/2010	May 9/2010	1	5	4	3.7	8.9	11.7	1.1	0.6
May 3/2010	May 9/2010	1	5	6	3.9	10.5	18.4	1.4	0.5
May 3/2010	May 9/2010	1	5	6	NA	NA	NA	NA	NA
May 3/2010	May 9/2010	1	5	2	3.5	8.1	14.0	0.8	0.5
May 3/2010	May 9/2010	1	5	2	3.0	7.6	11.0	0.8	0.5
May 3/2010	May 9/2010	1	5	4	4.3	15.0	NA	2.2	0.9
May 3/2010	May 9/2010	1	5	4	5.8	13.1	NA	2.9	0.6
May 3/2010	May 9/2010	1	5	6	4.5	10.5	NA	1.4	0.6
May 3/2010	May 9/2010	1	5	6	NA	NA	NA	NA	NA
May 3/2010	May 9/2010	1	5	2	4.0	13.8	NA	1.8	0.7
May 3/2010	May 9/2010	1	5	2	7.3	13.4	NA	1.3	0.7
May 3/2010	May 9/2010	1	5	4	4.6	11.2	NA	1.5	0.5
May 3/2010	May 9/2010	1	5	4	6.0	13.2	NA	1.5	0.6
May 3/2010	May 9/2010	1	5	6	4.5	NA	NA	1.0	NA
May 3/2010	May 9/2010	1	5	6	3.2	9.9	NA	1.5	0.6
May 3/2010	May 9/2010	1	5	2	4.4	9.3	NA	1.0	0.5
May 3/2010	May 9/2010	1	5	2	4.7	10.4	NA	1.1	0.5
May 3/2010	May 9/2010	1	5	4	6.6	12.5	NA	1.4	0.6

May 3/2010	May 9/2010	1	5	4	6.9	12.8	NA	1.1	0.6
May 3/2010	May 9/2010	1	5	6	4.8	11.5	NA	1.6	0.5
May 3/2010	May 9/2010	1	5	6	NA	NA	NA	NA	NA
May 3/2010	May 9/2010	1	5	2	4.6	10.3	NA	1.0	0.5
May 3/2010	May 9/2010	1	5	2	4.8	10.1	NA	1.0	0.6
May 3/2010	May 9/2010	1	5	4	6.2	14.3	NA	1.7	0.7
May 3/2010	May 9/2010	1	5	4	7.7	14.8	NA	1.4	0.6
May 3/2010	May 9/2010	1	5	6	5.3	11.5	NA	1.2	0.6
May 3/2010	May 9/2010	1	5	6	6.4	13.7	NA	1.5	0.6
May 3/2010	May 9/2010	1	5	2	4.8	10.8	NA	1.3	0.6
May 3/2010	May 9/2010	1	5	2	6.2	11.6	NA	0.9	0.6
May 3/2010	May 9/2010	1	5	4	3.6	10.6	NA	1.6	0.5
May 3/2010	May 9/2010	1	5	4	4.4	11.2	NA	1.5	0.5
May 3/2010	May 9/2010	1	5	6	4.0	12.2	NA	2.1	0.5
May 3/2010	May 9/2010	1	5	6	NA	NA	NA	NA	NA
May 3/2010	May 10/2010	1	5	2	3.5	8.0	11.0	0.8	0.6
May 3/2010	May 10/2010	1	5	2	4.5	10.6	22.0	1.5	0.6
May 3/2010	May 10/2010	1	5	4	5.1	11.0	16.8	1.4	0.6
May 3/2010	May 10/2010	1	5	4	5.7	11.4	17.7	1.2	0.6
May 3/2010	May 10/2010	1	5	6	4.0	10.6	18.4	1.4	0.5
May 3/2010	May 10/2010	1	5	6	NA	NA	NA	NA	NA
May 3/2010	May 10/2010	1	5	2	3.5	12.6	30.2	2.0	0.6
May 3/2010	May 10/2010	1	5	2	5.8	13.2	29.2	1.7	0.6
May 3/2010	May 10/2010	1	5	4	4.8	12.7	22.3	1.8	0.6
May 3/2010	May 10/2010	1	5	4	5.8	13.3	22.2	1.7	0.6
May 3/2010	May 10/2010	1	5	6	5.3	11.9	19.7	1.7	0.6
May 3/2010	May 10/2010	1	5	6	4.9	11.7	20.5	1.5	0.6
May 3/2010	May 10/2010	1	5	2	4.4	10.0	18.5	1.2	0.6
May 3/2010	May 10/2010	1	5	2	4.3	10.8	15.5	1.6	0.5
May 3/2010	May 10/2010	1	5	4	5.0	11.0	17.3	1.3	0.5
May 3/2010	May 10/2010	1	5	4	4.6	11.0	17.2	1.2	0.6
May 3/2010	May 10/2010	1	5	6	4.8	10.6	17.8	1.3	0.6

May 3/2010	May 10/2010	1	5	6	4.2	12.5	26.3	1.5	0.7
May 3/2010	May 10/2010	1	5	2	4.2	10.1	21.9	1.3	0.6
May 3/2010	May 10/2010	1	5	2	4.8	10.5	19.1	1.2	0.6
May 3/2010	May 10/2010	1	5	4	5.6	12.8	22.2	1.7	0.7
May 3/2010	May 10/2010	1	5	4	5.1	11.1	20.0	1.6	0.7
May 3/2010	May 10/2010	1	5	6	4.8	13.8	30.3	1.8	0.7
May 3/2010	May 10/2010	1	5	6	4.8	12.0	17.6	1.6	0.6
May 3/2010	May 10/2010	1	5	2	4.0	10.2	22.0	1.5	0.5
May 3/2010	May 10/2010	1	5	2	NA	NA	NA	NA	NA
May 3/2010	May 10/2010	1	5	4	4.8	NA	11.9	NA	8.8
May 3/2010	May 10/2010	1	5	4	5.5	11.5	15.8	1.5	0.6
May 3/2010	May 10/2010	1	5	6	5.0	10.5	15.9	1.6	0.6
May 3/2010	May 10/2010	1	5	6	NA	NA	NA	NA	NA
May 3/2010	May 10/2010	1	5	2	5.2	10.6	22.6	1.2	0.6
May 3/2010	May 10/2010	1	5	2	5.1	10.9	21.1	1.3	0.6
May 3/2010	May 10/2010	1	5	4	5.6	8.6	18.2	1.2	0.6
May 3/2010	May 10/2010	1	5	4	NA	NA	NA	NA	NA
May 3/2010	May 10/2010	1	5	6	4.2	13.1	27.5	2.1	0.7
May 3/2010	May 10/2010	1	5	6	5.0	12.0	23.3	1.8	0.6
May 3/2010	May 10/2010	1	5	2	4.2	11.6	26.2	1.6	0.7
May 3/2010	May 10/2010	1	5	2	4.7	10.7	21.5	1.4	0.6
May 3/2010	May 10/2010	1	5	4	6.6	13.1	35.0	2.1	0.8
May 3/2010	May 10/2010	1	5	4	6.1	11.0	17.2	1.0	0.6
May 3/2010	May 10/2010	1	5	6	5.4	12.6	20.2	2.1	0.6
May 3/2010	May 10/2010	1	5	6	NA	NA	NA	NA	NA
May 3/2010	May 10/2010	1	5	2	3.7	12.0	32.8	1.6	0.8
May 3/2010	May 10/2010	1	5	2	5.8	13.5	27.9	1.9	0.7
May 3/2010	May 10/2010	1	5	4	5.6	13.1	19.3	1.7	0.6
May 3/2010	May 10/2010	1	5	4	6.1	12.5	19.8	1.3	0.6
May 3/2010	May 10/2010	1	5	6	5.5	NA	12.8	1.2	NA
May 3/2010	May 10/2010	1	5	6	6.7	14.2	21.6	2.0	0.6
May 3/2010	May 10/2010	1	5	2	4.2	14.2	52.8	2.1	0.8

May 3/2010	May 10/2010	1	5	2	3.6	16.8	26.5	1.8	0.7
May 3/2010	May 10/2010	1	5	4	4.6	12.5	23.2	1.7	0.7
May 3/2010	May 10/2010	1	5	4	7.4	14.9	24.8	2.2	0.6
May 3/2010	May 10/2010	1	5	6	6.0	12.5	15.8	1.7	0.6
May 3/2010	May 10/2010	1	5	6	NA	NA	NA	NA	NA
May 3/2010	May 10/2010	1	5	2	4.6	12.2	23.7	1.6	0.7
May 3/2010	May 10/2010	1	5	2	5.6	13.5	32.5	1.8	0.7
May 3/2010	May 10/2010	1	5	4	4.4	13.4	30.9	1.1	0.8
May 3/2010	May 10/2010	1	5	4	NA	NA	NA	NA	NA
May 3/2010	May 10/2010	1	5	6	4.7	NA	8.2	0.9	NA
May 3/2010	May 10/2010	1	5	6	NA	NA	NA	NA	NA
May 3/2010	May 10/2010	1	5	2	5.2	14.4	33.4	2.1	0.8
May 3/2010	May 10/2010	1	5	2	4.6	13.4	29.3	2.1	0.7
May 3/2010	May 10/2010	1	5	4	6.9	13.2	20.3	1.6	0.6
May 3/2010	May 10/2010	1	5	4	7.2	13.2	18.4	1.6	0.6
May 3/2010	May 10/2010	1	5	6	7.2	14.0	20.1	1.5	0.6
May 3/2010	May 10/2010	1	5	6	7.2	15.1	23.0	8.7	0.7
May 3/2010	May 10/2010	1	5	NA	NA	NA	NA	NA	NA
May 3/2010	May 10/2010	1	5	NA	NA	NA	NA	NA	NA
May 3/2010	May 10/2010	1	5	2	5.5	13.6	30.5	1.6	0.6
May 3/2010	May 10/2010	1	5	2	4.6	13.0	32.0	2.0	0.7
May 3/2010	May 10/2010	1	5	4	7.0	11.9	36.3	2.2	0.7
May 3/2010	May 10/2010	1	5	4	6.4	16.4	42.0	2.4	0.7
May 3/2010	May 10/2010	1	5	6	6.5	13.1	17.6	1.6	0.6
May 3/2010	May 10/2010	1	5	6	NA	NA	NA	NA	NA
May 3/2010	May 10/2010	1	5	2	6.2	12.3	18.1	1.5	0.5
May 3/2010	May 10/2010	1	5	2	4.4	16.0	47.5	2.6	0.8
May 3/2010	May 10/2010	1	5	4	7.6	19.0	48.5	2.4	1.2
May 3/2010	May 10/2010	1	5	4	NA	NA	NA	NA	NA
May 3/2010	May 10/2010	1	5	6	7.0	16.8	43.5	2.1	0.8
May 3/2010	May 10/2010	1	5	6	6.3	NA	8.9	1.3	NA
May 3/2010	May 10/2010	1	5	2	5.4	14.6	43.5	1.4	0.9

May 3/2010	May 10/2010	1	5	2	3.0	12.1	27.5	2.5	0.7
May 3/2010	May 10/2010	1	5	4	7.2	15.8	33.5	2.6	0.8
May 3/2010	May 10/2010	1	5	4	8.7	18.1	40.0	2.1	0.7
May 3/2010	May 10/2010	1	5	6	4.0	16.5	50.5	2.2	1.0
May 3/2010	May 10/2010	1	5	6	7.0	13.8	20.5	2.0	0.6
May 3/2010	May 10/2010	1	5	2	3.8	14.4	74.5	2.1	1.0
May 3/2010	May 10/2010	1	5	2	6.4	16.8	58.0	2.1	0.7
May 3/2010	May 10/2010	1	5	4	7.1	19.3	48.2	2.8	0.8
May 3/2010	May 10/2010	1	5	4	7.2	18.2	47.0	2.5	0.8
May 3/2010	May 10/2010	1	5	6	7.0	14.5	18.5	2.1	0.6
May 3/2010	May 10/2010	1	5	6	5.6	17.6	46.8	2.9	0.8
May 3/2010	May 10/2010	1	5	2	5.8	13.4	26.0	1.7	0.6
May 3/2010	May 10/2010	1	5	2	3.1	13.4	57.5	2.0	0.7
May 3/2010	May 10/2010	1	5	4	7.0	16.5	40.5	2.0	0.8
May 3/2010	May 10/2010	1	5	4	6.3	17.8	47.5	2.5	0.7
May 3/2010	May 10/2010	1	5	6	5.9	14.6	26.5	2.3	0.6
May 3/2010	May 10/2010	1	5	6	5.5	14.2	28.0	2.3	0.7
May 3/2010	May 10/2010	1	5	2	5.7	12.5	20.2	6.6	0.6
May 3/2010	May 10/2010	1	5	2	6.1	14.1	26.5	1.7	0.7
May 3/2010	May 10/2010	1	5	4	5.0	11.7	20.5	1.6	0.6
May 3/2010	May 10/2010	1	5	4	4.7	11.0	17.0	1.6	0.6
May 3/2010	May 10/2010	1	5	6	4.3	9.7	18.1	1.3	0.6
May 3/2010	May 10/2010	1	5	6	5.2	10.9	15.2	1.2	0.6
May 3/2010	May 10/2010	1	5	2	4.4	14.0	39.5	1.6	0.8
May 3/2010	May 10/2010	1	5	2	4.9	13.2	25.5	1.3	0.6
May 3/2010	May 10/2010	1	5	4	NA	NA	NA	NA	NA
May 3/2010	May 10/2010	1	5	4	5.2	17.6	31.1	2.3	0.7
May 3/2010	May 10/2010	1	5	6	6.0	16.0	28.0	2.6	0.7
May 3/2010	May 10/2010	1	5	6	NA	NA	NA	NA	NA
May 3/2010	May 10/2010	1	5	2	4.7	11.4	23.5	1.8	0.6
May 3/2010	May 10/2010	1	5	2	6.1	3.1	25.5	1.8	0.6
May 3/2010	May 10/2010	1	5	4	5.6	10.9	15.3	1.1	0.5

May 3/2010	May 10/2010	1	5	4	5.2	12.3	16.3	1.7	0.6
May 3/2010	May 10/2010	1	5	6	5.9	NA	15.0	1.7	NA
May 3/2010	May 10/2010	1	5	6	NA	NA	NA	NA	NA
May 3/2010	May 10/2010	1	5	2	4.2	13.2	41.0	2.2	0.7
May 3/2010	May 10/2010	1	5	2	6.1	13.0	28.5	1.6	0.7
May 3/2010	May 10/2010	1	5	4	6.2	12.7	20.5	1.4	0.6
May 3/2010	May 10/2010	1	5	4	5.3	12.3	22.0	1.7	0.6
May 3/2010	May 10/2010	1	5	6	9.3	14.9	20.0	1.2	0.6
May 3/2010	May 10/2010	1	5	6	6.4	12.5	18.3	1.5	0.5
May 3/2010	May 10/2010	1	5	2	4.3	14.3	41.7	2.2	0.7
May 3/2010	May 10/2010	1	5	2	5.0	14.5	36.5	2.1	0.7
May 3/2010	May 10/2010	1	5	4	4.4	14.0	34.7	2.0	0.6
May 3/2010	May 10/2010	1	5	4	5.3	11.6	17.7	1.6	0.6
May 3/2010	May 10/2010	1	5	6	5.4	11.8	17.8	1.6	0.5
May 3/2010	May 10/2010	1	5	6	5.0	11.5	14.4	1.6	0.6
May 3/2010	May 10/2010	1	5	2	5.1	13.9	31.5	1.5	0.7
May 3/2010	May 10/2010	1	5	2	5.0	15.2	50.5	2.0	0.7
May 3/2010	May 10/2010	1	5	4	5.0	13.3	25.8	2.1	0.6
May 3/2010	May 10/2010	1	5	4	5.0	14.9	23.5	2.5	0.7
May 3/2010	May 10/2010	1	5	6	7.0	14.7	27.5	1.9	0.6
May 3/2010	May 10/2010	1	5	6	6.2	14.0	19.9	1.9	0.7
May 3/2010	May 10/2010	1	5	2	3.2	11.7	32.0	1.3	0.6
May 3/2010	May 10/2010	1	5	2	4.0	11.4	20.4	1.9	0.6
May 3/2010	May 10/2010	1	5	4	6.5	18.5	55.0	2.3	0.8
May 3/2010	May 10/2010	1	5	4	6.8	18.8	40.5	2.4	0.8
May 3/2010	May 10/2010	1	5	6	5.3	13.5	26.3	2.1	0.6
May 3/2010	May 10/2010	1	5	6	5.3	14.3	27.5	2.0	0.6
May 3/2010	May 10/2010	1	5	2	4.4	10.3	18.3	1.4	0.6
May 3/2010	May 10/2010	1	5	2	4.3	11.2	20.5	5.6	0.5
May 3/2010	May 10/2010	1	5	4	6.0	14.8	27.5	1.8	0.7
May 3/2010	May 10/2010	1	5	4	5.6	16.6	24.1	2.1	0.7
May 3/2010	May 10/2010	1	5	6	5.8	18.0	41.3	3.0	0.8

May 3/2010	May 10/2010	1	5	6	5.8	15.6	33.3	2.1	0.8
May 3/2010	May 10/2010	1	5	2	4.4	11.5	23.5	1.6	0.6
May 3/2010	May 10/2010	1	5	2	4.6	14.1	43.8	2.1	0.7
May 3/2010	May 10/2010	1	5	4	4.8	12.6	26.8	2.1	0.7
May 3/2010	May 10/2010	1	5	4	4.4	10.4	16.4	1.3	0.6
May 3/2010	May 10/2010	1	5	4	4.5	13.7	29.2	2.7	0.7
May 3/2010	May 10/2010	1	5	6	5.9	15.5	33.5	2.3	0.7
May 3/2010	May 10/2010	1	5	6	5.7	12.5	20.0	1.7	0.7
May 3/2010	May 10/2010	1	5	2	3.5	8.6	16.5	1.0	0.5
May 3/2010	May 10/2010	1	5	2	3.6	10.0	13.5	1.7	0.6
May 3/2010	May 10/2010	1	5	4	5.0	11.0	17.4	1.4	0.6
May 3/2010	May 10/2010	1	5	4	5.5	12.2	21.8	1.6	0.6
May 3/2010	May 10/2010	1	5	4	6.6	17.4	41.8	2.5	1.0
May 3/2010	May 10/2010	1	5	6	6.0	14.5	25.0	1.9	0.6
May 3/2010	May 10/2010	1	5	6	5.0	10.5	15.5	1.2	0.5
May 3/2010	May 10/2010	1	5	6	6.4	13.0	21.8	1.8	0.6
May 3/2010	May 10/2010	1	5	2	3.9	11.4	22.4	1.6	0.5
May 3/2010	May 10/2010	1	5	2	4.9	11.1	19.5	1.5	0.6
May 3/2010	May 10/2010	1	5	4	6.1	11.8	19.0	1.3	0.5
May 3/2010	May 10/2010	1	5	4	7.3	15.8	35.5	2.2	0.7
May 3/2010	May 10/2010	1	5	6	5.5	13.2	21.5	2.1	0.6
May 3/2010	May 10/2010	1	5	6	NA	NA	NA	NA	NA
May 3/2010	May 10/2010	1	5	2	3.2	13.1	84.5	1.7	0.8
May 3/2010	May 10/2010	1	5	2	NA	NA	NA	NA	NA
May 3/2010	May 10/2010	1	5	4	5.1	12.1	18.2	1.6	0.6
May 3/2010	May 10/2010	1	5	4	6.2	12.6	19.5	1.3	0.6
May 3/2010	May 10/2010	1	5	6	NA	NA	NA	NA	NA
May 3/2010	May 10/2010	1	5	6	NA	NA	NA	NA	NA
May 3/2010	May 10/2010	1	5	2	4.3	11.1	25.7	1.4	0.6
May 3/2010	May 10/2010	1	5	2	4.9	12.0	26.2	1.6	0.6
May 3/2010	May 10/2010	1	5	4	5.7	12.1	19.0	1.4	0.6
May 3/2010	May 10/2010	1	5	4	6.0	12.9	20.0	1.6	0.6

May 3/2010	May 10/2010	1	5	6	6.3	11.7	16.4	1.2	0.6
May 3/2010	May 10/2010	1	5	6	6.5	12.7	16.3	1.5	0.7
May 3/2010	May 10/2010	1	5	2	3.6	8.7	13.0	0.8	0.5
May 3/2010	May 10/2010	1	5	2	2.7	NA	9.6	0.8	NA
May 3/2010	May 10/2010	1	5	4	5.5	NA	16.5	2.1	NA
May 3/2010	May 10/2010	1	5	4	5.0	11.2	12.2	1.6	0.6
May 3/2010	May 10/2010	1	5	6	4.9	11.5	15.2	1.6	0.5
May 3/2010	May 10/2010	1	5	6	NA	NA	NA	NA	NA
May 3/2010	May 10/2010	1	5	2	3.1	8.8	10.7	1.2	0.5
May 3/2010	May 10/2010	1	5	2	3.0	9.5	23.2	1.5	0.6
May 3/2010	May 10/2010	1	5	4	NA	NA	NA	NA	NA
May 3/2010	May 10/2010	1	5	4	NA	NA	NA	NA	NA
May 3/2010	May 10/2010	1	5	6	5.2	11.2	15.7	1.6	0.6
May 3/2010	May 10/2010	1	5	6	NA	NA	NA	NA	NA
May 3/2010	May 30/2010	1	5	2	18.1	23.6	26.4	1.3	0.6
May 3/2010	May 30/2010	1	5	2	22.1	28.2	30.0	1.5	NA
May 3/2010	May 30/2010	1	5	4	28.0	35.2	40.1	1.8	0.6
May 9/2010	May 30/2010	1	5	4	12.2	17.4	21.0	1.2	0.6
May 3/2010	May 30/2010	1	5	6	21.5	26.7	27.5	1.2	NA
May 3/2010	May 30/2010	1	5	6	20.7	26.5	28.0	1.3	NA
May 3/2010	May 30/2010	1	5	2	16.1	24.0	35.5	1.7	0.6
May 3/2010	May 30/2010	1	5	2	21.5	28.3	37.2	1.6	0.6
May 3/2010	May 30/2010	1	5	4	28.2	36.2	39.5	1.8	0.6
May 3/2010	May 30/2010	1	5	4	29.0	35.8	40.5	1.6	0.6
May 3/2010	May 30/2010	1	5	6	25.9	31.9	36.0	1.5	0.6
May 3/2010	May 30/2010	1	5	6	25.0	32.0	36.2	1.7	0.6
May 3/2010	May 30/2010	1	5	2	19.2	26.3	33.5	1.6	0.5
May 3/2010	May 30/2010	1	5	2	21.2	27.6	30.7	1.7	0.6
May 3/2010	May 30/2010	1	5	4	25.6	32.8	34.7	2.0	0.6
May 9/2010	May 30/2010	1	5	4	NA	NA	NA	NA	NA
May 3/2010	May 30/2010	1	5	6	28.7	37.0	41.5	2.1	0.6
May 3/2010	May 30/2010	1	5	6	23.7	30.6	33.8	1.8	0.6

May 3/2010	May 30/2010	1	5	2	14.0	21.0	24.6	1.7	0.7
May 3/2010	May 30/2010	1	5	2	27.6	35.4	40.4	1.8	0.6
May 9/2010	May 30/2010	1	5	4	23.6	30.1	32.5	1.5	0.6
May 3/2010	May 30/2010	1	5	4	NA	NA	NA	NA	NA
May 3/2010	May 30/2010	1	5	6	29.5	NA	37.0	1.8	NA
May 9/2010	May 30/2010	1	5	6	11.7	17.5	20.0	1.5	0.6
May 3/2010	May 31/2010	1	5	2	12.9	NA	17.5	1.0	NA
May 3/2010	May 31/2010	1	5	2	NA	NA	NA	NA	NA
May 3/2010	May 31/2010	1	5	4	27.4	NA	35.5	1.9	NA
May 3/2010	May 31/2010	1	5	4	9.5	NA	10.5	0.6	NA
May 3/2010	May 31/2010	1	5	6	24.2	31.2	36.0	1.9	0.7
May 9/2010	May 31/2010	1	5	6	11.2	16.6	18.5	1.1	0.6
May 3/2010	May 31/2010	1	5	2	10.5	NA	13.5	0.8	NA
May 3/2010	May 31/2010	1	5	2	9.5	NA	14.0	0.8	NA
May 3/2010	May 31/2010	1	5	4	34.6	47.6	73.0	3.8	0.8
May 3/2010	May 31/2010	1	5	4	26.9	34.8	38.5	2.0	0.7
May 3/2010	May 31/2010	1	5	6	23.0	29.4	32.5	1.5	0.6
May 9/2010	May 31/2010	1	5	6	NA	NA	NA	NA	NA
May 3/2010	May 31/2010	1	5	2	28.1	41.2	76.5	3.1	0.7
May 3/2010	May 31/2010	1	5	2	29.2	35.6	57.1	1.3	0.7
May 3/2010	May 31/2010	1	5	4	29.6	37.2	39.5	1.7	0.6
May 3/2010	May 31/2010	1	5	4	NA	NA	NA	NA	NA
May 9/2010	May 31/2010	1	5	6	16.4	22.6	27.4	1.2	0.6
May 9/2010	May 31/2010	1	5	6	NA	NA	NA	NA	NA
May 3/2010	May 31/2010	1	5	2	14.5	NA	18.4	0.9	NA
May 3/2010	May 31/2010	1	5	2	15.9	NA	18.5	0.9	NA
May 3/2010	May 31/2010	1	5	4	30.6	NA	37.5	1.4	NA
May 3/2010	May 31/2010	1	5	4	10.4	15.9	19.2	1.2	0.6
May 3/2010	May 31/2010	1	5	6	36.2	43.5	48.5	1.6	0.6
May 9/2010	May 31/2010	1	5	6	15.6	22.2	30.5	1.2	0.6
May 3/2010	May 31/2010	1	5	2	18.5	24.0	27.5	1.1	0.6
May 3/2010	May 31/2010	1	5	2	NA	NA	NA	NA	NA

May 9/2010	May 31/2010	1	5	4	23.2	NA	26.5	NA	NA
May 3/2010	May 31/2010	1	5	4	16.3	23.1	30.5	1.5	0.6
May 3/2010	May 31/2010	1	5	6	29.4	NA	30.5	NA	NA
May 3/2010	May 31/2010	1	5	6	36.2	44.3	46.1	1.7	0.6
May 3/2010	May 31/2010	1	5	2	19.8	NA	24.6	1.5	NA
May 3/2010	May 31/2010	1	5	2	27.6	NA	30.6	1.2	NA
May 3/2010	May 31/2010	1	5	4	28.0	36.1	43.5	2.3	0.6
May 3/2010	May 31/2010	1	5	4	33.4	40.7	47.6	1.7	0.7
May 3/2010	May 31/2010	1	5	6	23.5	NA	25.5	NA	NA
May 9/2010	May 31/2010	1	5	6	17.0	23.6	26.5	1.5	0.6
May 3/2010	May 31/2010	1	5	2	11.6	16.2	18.5	1.3	0.6
May 3/2010	May 31/2010	1	5	2	19.0	NA	25.1	1.5	NA
May 3/2010	May 31/2010	1	5	4	24.2	NA	27.3	1.6	NA
May 3/2010	May 31/2010	1	5	4	23.8	NA	29.5	1.3	NA
May 3/2010	May 31/2010	1	5	6	NA	NA	NA	NA	NA
May 10/2010	May 31/2010	1	5	6	8.0	12.8	15.2	1.1	0.6
May 3/2010	May 31/2010	1	5	2	24.9	36.0	50.0	3.0	0.6
May 3/2010	May 31/2010	1	5	2	25.9	33.6	39.0	2.3	0.6
May 3/2010	May 31/2010	1	5	4	NA	NA	NA	NA	NA
May 3/2010	May 31/2010	1	5	4	30.5	38.3	42.5	1.8	0.6
May 3/2010	May 31/2010	1	5	6	30.7	37.3	43.5	1.7	1.0
May 3/2010	May 31/2010	1	5	6	33.1	NA	39.5	1.2	NA
May 3/2010	May 31/2010	1	5	2	20.1	NA	27.2	1.7	NA
May 3/2010	May 31/2010	1	5	2	NA	NA	NA	NA	NA
May 3/2010	May 31/2010	1	5	4	26.5	29.5	31.0	1.3	0.6
May 3/2010	May 31/2010	1	5	4	23.1	NA	29.0	1.6	NA
May 3/2010	May 31/2010	1	5	6	25.6	31.9	36.0	2.0	0.6
May 10/2010	May 31/2010	1	5	6	18.7	25.6	32.0	1.2	0.6
May 3/2010	May 31/2010	1	5	2	19.5	25.0	30.2	1.4	0.6
May 3/2010	May 31/2010	1	5	2	19.3	NA	23.5	1.3	NA
May 3/2010	May 31/2010	1	5	4	32.2	39.6	42.7	1.7	0.6
May 3/2010	May 31/2010	1	5	4	25.7	NA	32.5	1.6	NA

May 3/2010	May 31/2010	1	5	6	25.5	NA	27.0	NA	NA
May 3/2010	May 31/2010	1	5	6	22.7	40.5	46.1	2.1	0.6
May 3/2010	May 31/2010	1	5	2	15.9	22.2	27.5	1.7	0.6
May 10/2010	May 31/2010	1	5	2	13.5	20.5	30.2	2.0	0.6
May 3/2010	May 31/2010	1	5	4	NA	NA	NA	NA	NA
May 3/2010	May 31/2010	1	5	4	24.7	31.0	33.0	1.5	0.6
May 3/2010	May 31/2010	1	5	6	13.1	19.2	23.0	1.5	0.6
May 10/2010	May 31/2010	1	5	6	NA	NA	NA	NA	NA
May 3/2010	May 31/2010	1	5	2	22.2	27.7	33.5	1.1	0.5
May 3/2010	May 31/2010	1	5	2	20.4	26.5	32.9	1.2	0.5
May 3/2010	May 31/2010	1	5	4	NA	NA	NA	NA	NA
May 10/2010	May 31/2010	1	5	4	17.9	24.7	34.2	1.5	0.7
May 3/2010	May 31/2010	1	5	6	39.8	49.8	57.1	2.7	0.7
May 3/2010	May 31/2010	1	5	6	26.9	NA	30.5	1.3	NA
May 3/2010	May 31/2010	1	5	2	21.1	28.7	33.7	1.9	0.6
May 3/2010	May 31/2010	1	5	2	19.1	NA	28.8	1.2	NA
May 3/2010	May 31/2010	1	5	4	37.5	NA	46.0	2.3	NA
May 10/2010	May 31/2010	1	5	4	16.7	23.6	28.8	1.3	0.5
May 3/2010	May 31/2010	1	5	6	41.0	49.0	54.0	2.3	0.6
May 10/2010	May 31/2010	1	5	6	26.2	33.8	43.3	1.8	0.6
May 3/2010	May 31/2010	1	5	2	15.5	21.0	22.5	1.0	0.5
May 3/2010	May 31/2010	1	5	2	NA	NA	NA	NA	NA
May 3/2010	May 31/2010	1	5	4	29.4	36.9	39.8	1.7	0.5
May 3/2010	May 31/2010	1	5	4	26.2	NA	32.5	1.2	NA
May 10/2010	May 31/2010	1	5	6	22.5	30.6	36.7	1.8	0.6
May 3/2010	May 31/2010	1	5	6	NA	NA	NA	NA	NA
May 3/2010	May 31/2010	1	5	2	20.1	31.6	66.5	2.8	0.8
May 3/2010	May 31/2010	1	5	2	NA	NA	NA	NA	NA
May 3/2010	May 31/2010	1	5	4	28.7	37.4	47.5	2.2	0.6
May 3/2010	May 31/2010	1	5	4	NA	NA	NA	NA	NA
May 10/2010	May 31/2010	1	5	6	NA	NA	NA	NA	NA
May 10/2010	May 31/2010	1	5	6	NA	NA	NA	NA	NA

May 3/2010	May 31/2010	1	5	2	26.5	34.7	41.5	2.2	0.7
May 3/2010	May 31/2010	1	5	2	26.2	34.5	46.8	2.1	0.6
May 3/2010	May 31/2010	1	5	4	31.2	41.5	55.1	2.7	0.7
May 10/2010	May 31/2010	1	5	4	20.9	17.1	36.6	1.5	0.7
May 10/2010	May 31/2010	1	5	6	24.1	32.7	42.8	2.3	0.7
May 10/2010	May 31/2010	1	5	6	21.1	31.0	43.5	2.6	0.7
May 3/2010	May 31/2010	1	5	2	25.6	34.7	44.0	2.2	0.6
May 3/2010	May 31/2010	1	5	2	26.6	NA	33.2	1.5	NA
May 3/2010	May 31/2010	1	5	4	32.6	NA	38.1	1.6	NA
May 3/2010	May 31/2010	1	5	4	34.7	NA	40.0	1.5	NA
May 3/2010	May 31/2010	1	5	6	47.2	53.5	55.5	1.3	0.5
May 3/2010	May 31/2010	1	5	6	56.2	64.9	67.5	2.2	0.6
May 3/2010	May 31/2010	1	5	2	19.7	29.4	38.2	2.3	0.5
May 3/2010	May 31/2010	1	5	2	16.1	23.4	29.1	1.5	0.6
May 3/2010	May 31/2010	1	5	4	37.4	47.8	60.8	2.5	0.7
May 3/2010	May 31/2010	1	5	4	36.0	42.0	60.5	2.6	0.7
May 3/2010	May 31/2010	1	5	6	NA	NA	NA	NA	NA
May 3/2010	May 31/2010	1	5	6	NA	NA	NA	NA	NA
May 3/2010	May 31/2010	1	5	2	25.2	36.8	32.5	1.2	0.6
May 3/2010	May 31/2010	1	5	2	NA	NA	NA	NA	NA
May 3/2010	May 31/2010	1	5	4	34.6	NA	40.0	NA	NA
May 10/2010	May 31/2010	1	5	4	26.1	36.4	54.6	2.3	0.7
May 3/2010	May 31/2010	1	5	6	27.0	68.4	89.1	2.1	0.8
May 10/2010	May 31/2010	1	5	6	28.3	38.4	49.4	2.6	0.6
May 3/2010	May 31/2010	1	5	2	35.0	44.8	62.2	1.3	0.8
May 3/2010	May 31/2010	1	5	2	21.0	31.6	40.1	3.1	0.6
May 3/2010	May 31/2010	1	5	4	46.5	57.5	70.4	2.2	0.7
May 3/2010	May 31/2010	1	5	4	NA	NA	NA	NA	NA
May 3/2010	May 31/2010	1	5	6	NA	NA	NA	NA	NA
May 3/2010	May 31/2010	1	5	6	38.4	45.2	46.8	2.0	0.6
May 3/2010	May 31/2010	1	5	2	26.7	40.4	98.2	3.5	0.9
May 3/2010	May 31/2010	1	5	2	31.5	43.5	72.5	2.8	0.6

May 3/2010	May 31/2010	1	5	4	42.4	57.7	73.0	5.5	0.9
May 3/2010	May 31/2010	1	5	4	32.2	42.2	47.5	3.0	0.7
May 3/2010	May 31/2010	1	5	6	45.1	53.5	54.8	2.3	0.6
May 3/2010	May 31/2010	1	5	6	NA	NA	NA	NA	NA
May 3/2010	May 31/2010	1	5	2	18.1	NA	22.5	1.1	NA
May 3/2010	May 31/2010	1	5	2	NA	NA	NA	NA	NA
May 3/2010	May 31/2010	1	5	4	NA	NA	NA	NA	NA
May 3/2010	May 31/2010	1	5	4	NA	NA	NA	NA	NA
May 3/2010	May 31/2010	1	5	6	44.8	54.1	61.5	2.2	0.6
May 3/2010	May 31/2010	1	5	6	39.0	47.8	53.3	2.5	0.7
May 3/2010	May 31/2010	1	5	2	26.8	33.7	37.1	1.7	0.6
May 3/2010	May 31/2010	1	5	2	26.1	34.5	38.1	2.1	0.6
May 3/2010	May 31/2010	1	5	4	27.1	34.2	39.0	2.1	0.7
May 3/2010	May 31/2010	1	5	4	25.7	32.5	33.8	1.8	0.6
May 10/2010	May 31/2010	1	5	6	20.3	29.5	43.1	2.4	0.6
May 3/2010	May 31/2010	1	5	6	29.7	35.5	39.1	1.3	0.6
May 3/2010	May 31/2010	1	5	2	20.2	NA	27.5	1.5	NA
May 3/2010	May 31/2010	1	5	2	24.8	32.0	36.2	1.8	0.5
May 3/2010	May 31/2010	1	5	4	NA	NA	NA	NA	NA
May 10/2010	May 31/2010	1	5	4	16.5	23.8	31.5	1.8	0.6
May 10/2010	May 31/2010	1	5	6	24.2	33.4	42.5	2.7	0.8
May 10/2010	May 31/2010	1	5	6	22.4	35.4	51.5	3.7	0.7
May 3/2010	May 31/2010	1	5	2	NA	NA	NA	NA	NA
May 3/2010	May 31/2010	1	5	2	23.7	33.8	53.5	2.6	0.7
May 3/2010	May 31/2010	1	5	4	30.3	NA	35.5	1.5	NA
May 3/2010	May 31/2010	1	5	4	26.5	33.8	38.5	2.0	0.6
May 10/2010	May 31/2010	1	5	6	21.5	30.1	49.2	2.2	0.7
May 3/2010	May 31/2010	1	5	6	NA	NA	NA	NA	NA
May 3/2010	May 31/2010	1	5	2	19.0	30.8	49.5	2.6	0.8
May 3/2010	May 31/2010	1	5	2	24.9	35.6	52.5	3.0	0.6
May 3/2010	May 31/2010	1	5	4	36.2	NA	42.9	2.0	NA
May 3/2010	May 31/2010	1	5	4	NA	NA	NA	NA	NA

May 3/2010	May 31/2010	1	5	6	33.8	NA	40.5	1.5	NA
May 3/2010	May 31/2010	1	5	6	33.7	NA	35.0	NA	NA
May 3/2010	May 31/2010	1	5	2	27.5	37.1	51.5	2.4	0.7
May 3/2010	May 31/2010	1	5	2	33.0	45.1	63.0	3.3	0.8
May 3/2010	May 31/2010	1	5	4	33.0	41.7	47.5	2.3	0.6
May 3/2010	May 31/2010	1	5	4	27.0	NA	31.0	1.2	NA
May 3/2010	May 31/2010	1	5	6	NA	NA	NA	NA	NA
May 3/2010	May 31/2010	1	5	6	46.8	55.2	59.8	2.3	0.7
May 3/2010	May 31/2010	1	5	2	17.9	27.1	40.4	1.7	0.7
May 3/2010	May 31/2010	1	5	2	18.2	25.7	27.5	2.2	0.6
May 3/2010	May 31/2010	1	5	4	49.5	62.8	92.0	2.3	0.8
May 3/2010	May 31/2010	1	5	4	52.6	66.1	92.5	3.2	0.9
May 3/2010	May 31/2010	1	5	6	35.3	44.2	54.3	2.2	0.7
May 3/2010	May 31/2010	1	5	6	NA	NA	NA	NA	NA
May 3/2010	May 31/2010	1	5	2	16.7	22.5	26.2	1.4	0.5
May 3/2010	May 31/2010	1	5	2	NA	NA	NA	NA	NA
May 3/2010	May 31/2010	1	5	4	33.7	41.8	47.0	1.7	0.7
May 3/2010	May 31/2010	1	5	4	35.0	43.3	45.5	2.2	0.6
May 3/2010	May 31/2010	1	5	6	46.7	60.4	78.9	3.6	0.7
May 3/2010	May 31/2010	1	5	6	NA	NA	NA	NA	NA
May 10/2010	May 31/2010	1	5	2	NA	NA	NA	NA	NA
May 3/2010	May 31/2010	1	5	2	26.3	36.5	58.7	2.1	0.7
May 3/2010	May 31/2010	1	5	4	28.6	33.1	38.4	2.2	0.6
May 3/2010	May 31/2010	1	5	4	20.3	26.4	28.5	1.4	0.6
May 3/2010	May 31/2010	1	5	6	41.7	52.3	59.5	2.8	0.7
May 3/2010	May 31/2010	1	5	6	24.2	31.3	33.8	1.7	0.6
May 3/2010	May 31/2010	1	5	2	10.9	16.0	19.6	1.2	0.5
May 3/2010	May 31/2010	1	5	2	11.9	17.0	19.6	1.0	0.5
May 3/2010	May 31/2010	1	5	4	18.6	22.0	23.3	1.3	0.5
May 3/2010	May 31/2010	1	5	4	24.0	30.7	33.5	1.6	0.5
May 10/2010	May 31/2010	1	5	6	24.9	NA	30.1	1.2	NA
May 3/2010	May 31/2010	1	5	6	32.0	39.8	41.5	1.6	0.5

May 3/2010	June 1/2010	1	5	2	NA	NA	NA	NA	NA
May 3/2010	June 1/2010	1	5	2	NA	NA	NA	NA	NA
May 3/2010	June 1/2010	1	5	4	NA	NA	NA	NA	NA
May 3/2010	June 1/2010	1	5	4	NA	NA	NA	NA	NA
May 3/2010	June 1/2010	1	5	6	NA	NA	NA	NA	NA
May 10/2010	June 1/2010	1	5	6	NA	NA	NA	NA	NA
May 3/2010	June 1/2010	1	5	2	NA	NA	NA	NA	NA
May 10/2010	June 1/2010	1	5	2	NA	NA	NA	NA	NA
May 10/2010	June 1/2010	1	5	4	12.2	18.1	23.8	1.2	0.6
May 10/2010	June 1/2010	1	5	4	15.8	NA	26.5	1.2	NA
May 10/2010	June 1/2010	1	5	6	20.0	31.0	54.0	3.8	0.7
May 10/2010	June 1/2010	1	5	6	NA	NA	NA	NA	NA
May 3/2010	June 1/2010	1	5	2	NA	NA	NA	NA	NA
May 3/2010	June 1/2010	1	5	2	NA	NA	NA	NA	NA
May 3/2010	June 1/2010	1	5	4	22.8	NA	28.7	1.5	NA
May 3/2010	June 1/2010	1	5	4	23.3	NA	28.0	NA	NA
May 3/2010	June 1/2010	1	5	6	NA	NA	NA	NA	NA
May 3/2010	June 1/2010	1	5	6	NA	NA	NA	NA	NA
May 3/2010	June 1/2010	1	5	2	NA	NA	NA	NA	NA
May 10/2010	June 1/2010	1	5	2	NA	NA	NA	NA	NA
May 10/2010	June 1/2010	1	5	4	NA	NA	NA	NA	NA
May 3/2010	June 1/2010	1	5	4	NA	NA	NA	NA	NA
May 3/2010	June 1/2010	1	5	6	NA	NA	NA	NA	NA
May 10/2010	June 1/2010	1	5	6	15.0	20.0	25.2	0.9	0.6
May 3/2010	June 1/2010	1	5	2	NA	NA	NA	NA	NA
May 3/2010	June 1/2010	1	5	2	NA	NA	NA	NA	NA
May 10/2010	June 1/2010	1	5	4	NA	NA	NA	NA	NA
May 10/2010	June 1/2010	1	5	4	NA	NA	NA	NA	NA
May 10/2010	June 1/2010	1	5	6	22.7	32.0	37.4	2.0	0.7
May 10/2010	June 1/2010	1	5	6	NA	NA	NA	NA	NA
May 3/2010	June 1/2010	1	5	2	NA	NA	NA	NA	NA
May 3/2010	June 1/2010	1	5	2	NA	NA	NA	NA	NA

May 3/2010	June 1/2010	1	5	4	NA	NA	NA	NA	NA
May 3/2010	June 1/2010	1	5	4	NA	NA	NA	NA	NA
May 3/2010	June 1/2010	1	5	6	NA	NA	NA	NA	NA
May 3/2010	June 1/2010	1	5	6	NA	NA	NA	NA	NA
May 3/2010	June 1/2010	1	5	2	31.6	43.0	59.7	2.2	0.8
May 3/2010	June 1/2010	1	5	2	28.1	37.7	49.4	2.2	0.7
May 10/2010	June 1/2010	1	5	4	23.3	30.5	41.0	1.3	0.6
May 3/2010	June 1/2010	1	5	4	45.8	60.0	74.5	3.6	0.7
May 3/2010	June 1/2010	1	5	6	38.9	NA	40.0	NA	NA
May 10/2010	June 1/2010	1	5	6	57.0	67.2	2.7	78.5	0.7
May 30/2010	June 6/2010	1	5	2	3.8	10.3	30.0	1.5	7.0
May 30/2010	June 6/2010	1	5	2	3.6	11.3	33.8	1.5	0.6
May 30/2010	June 6/2010	1	5	4	4.1	13.4	47.5	1.9	0.7
May 30/2010	June 6/2010	1	5	4	4.0	9.8	19.0	1.1	0.6
May 30/2010	June 6/2010	1	5	6	3.7	10.8	31.8	1.7	0.7
May 30/2010	June 6/2010	1	5	6	3.2	9.6	31.2	1.3	0.6
May 30/2010	June 6/2010	1	5	2	3.7	21.2	34.5	0.9	0.6
May 30/2010	June 6/2010	1	5	2	2.7	10.5	37.8	1.7	0.6
May 30/2010	June 6/2010	1	5	4	NA	NA	NA	NA	NA
May 30/2010	June 6/2010	1	5	4	3.8	12.7	46.5	1.8	0.7
May 30/2010	June 6/2010	1	5	6	3.3	11.6	4.5	2.3	0.6
May 30/2010	June 6/2010	1	5	6	4.5	11.0	40.8	1.2	0.6
May 30/2010	June 6/2010	1	5	2	2.9	10.5	37.5	1.7	0.6
May 30/2010	June 6/2010	1	5	2	3.6	11.4	29.5	1.5	0.6
May 30/2010	June 6/2010	1	5	4	4.1	14.7	44.5	2.1	0.8
May 30/2010	June 6/2010	1	5	4	3.5	9.7	21.8	1.3	0.6
May 30/2010	June 6/2010	1	5	6	3.1	12.7	45.5	1.9	0.7
May 30/2010	June 6/2010	1	5	6	3.3	11.6	38.5	2.0	0.7
May 30/2010	June 6/2010	1	5	2	1.9	8.9	28.5	1.4	0.6
May 30/2010	June 6/2010	1	5	2	3.2	11.3	44.6	1.1	0.6
May 30/2010	June 6/2010	1	5	4	NA	NA	NA	NA	NA
May 30/2010	June 6/2010	1	5	4	4.0	10.9	23.1	1.6	0.7

May 30/2010	June 6/2010	1	5	6	3.4	10.1	19.1	1.7	0.7
May 30/2010	June 6/2010	1	5	6	NA	NA	NA	NA	NA
May 31/2010	June 6/2010	1	5	2	3.2	9.4	21.5	1.3	0.6
May 31/2010	June 6/2010	1	5	2	1.8	8.4	21.2	1.5	0.6
May 31/2010	June 6/2010	1	5	4	NA	NA	NA	NA	NA
May 31/2010	June 6/2010	1	5	4	3.2	10.0	26.1	1.6	0.6
May 31/2010	June 6/2010	1	5	6	NA	NA	NA	NA	NA
May 31/2010	June 6/2010	1	5	6	2.8	8.0	19.0	1.0	0.6
May 31/2010	June 6/2010	1	5	2	2.2	6.6	13.9	0.7	0.5
May 31/2010	June 6/2010	1	5	2	2.2	6.5	15.4	0.7	0.5
May 31/2010	June 6/2010	1	5	4	3.2	12.6	78.0	1.3	0.8
May 31/2010	June 6/2010	1	5	4	3.3	12.1	16.5	1.7	0.7
May 31/2010	June 6/2010	1	5	6	1.4	8.5	19.8	1.4	0.6
May 31/2010	June 6/2010	1	5	6	4.5	12.0	39.5	1.4	0.6
May 31/2010	June 6/2010	1	5	2	1.8	9.5	78.0	1.1	0.7
May 31/2010	June 6/2010	1	5	2	2.5	10.1	57.5	1.2	0.6
May 31/2010	June 6/2010	1	5	4	2.6	11.9	42.5	1.8	0.7
May 31/2010	June 6/2010	1	5	4	3.6	13.1	47.9	2.1	0.7
May 31/2010	June 6/2010	1	5	6	4.0	12.8	35.1	2.0	0.7
May 31/2010	June 6/2010	1	5	6	3.5	11.3	29.7	1.8	0.7
May 31/2010	June 6/2010	1	5	2	1.8	8.3	22.5	1.0	0.5
May 31/2010	June 6/2010	1	5	2	6.5	9.0	21.0	1.1	0.5
May 31/2010	June 6/2010	1	5	4	2.6	11.5	45.0	1.6	0.7
May 31/2010	June 6/2010	1	5	4	4.0	12.4	40.5	1.3	0.7
May 31/2010	June 6/2010	1	5	6	4.0	14.8	39.0	2.1	0.8
May 31/2010	June 6/2010	1	5	6	4.5	12.5	38.5	1.7	0.7
May 31/2010	June 6/2010	1	5	2	3.8	10.3	33.5	4.5	0.6
May 31/2010	June 6/2010	1	5	2	3.0	8.7	28.5	1.1	0.7
May 31/2010	June 6/2010	1	5	4	3.8	11.0	36.5	1.4	0.6
May 31/2010	June 6/2010	1	5	4	3.6	12.1	33.5	2.0	0.6
May 31/2010	June 6/2010	1	5	6	NA	NA	NA	NA	NA
May 31/2010	June 6/2010	1	5	6	4.0	13.4	47.5	1.3	0.6

May 31/2010	June 6/2010	1	5	2	3.1	9.8	28.0	1.2	0.5
May 31/2010	June 6/2010	1	5	2	4.2	12.5	40.5	1.5	0.6
May 31/2010	June 6/2010	1	5	4	2.9	9.5	16.5	1.2	0.6
May 31/2010	June 6/2010	1	5	4	4.5	15.2	59.1	2.3	0.7
May 31/2010	June 6/2010	1	5	6	5.7	14.3	35.5	2.2	0.7
May 31/2010	June 6/2010	1	5	6	4.2	10.3	32.0	1.2	0.6
May 31/2010	June 6/2010	1	5	2	2.5	7.9	18.9	0.9	0.5
May 31/2010	June 6/2010	1	5	2	3.5	10.5	30.1	1.4	0.6
May 31/2010	June 6/2010	1	5	4	3.8	11.0	34.0	4.5	0.7
May 31/2010	June 6/2010	1	5	4	3.8	11.1	35.5	1.7	0.6
May 31/2010	June 6/2010	1	5	6	2.6	9.2	24.3	1.5	0.6
May 31/2010	June 6/2010	1	5	6	3.8	8.9	17.1	1.0	0.5
May 31/2010	June 6/2010	1	5	2	3.4	10.7	51.0	1.3	0.7
May 31/2010	June 6/2010	1	5	2	2.7	10.7	42.5	1.3	0.7
May 31/2010	June 6/2010	1	5	4	3.9	10.2	24.1	1.3	0.7
May 31/2010	June 6/2010	1	5	4	3.3	12.3	49.5	2.1	0.7
May 31/2010	June 6/2010	1	5	6	3.2	13.6	47.5	2.3	0.7
May 31/2010	June 6/2010	1	5	6	3.3	9.5	24.4	1.5	0.5
May 31/2010	June 6/2010	1	5	2	1.8	8.5	24.0	1.3	0.5
May 31/2010	June 6/2010	1	5	2	4.0	10.5	31.5	1.2	0.5
May 31/2010	June 6/2010	1	5	4	5.2	13.1	39.9	1.6	0.6
May 31/2010	June 6/2010	1	5	4	3.4	10.8	35.3	1.6	0.6
May 31/2010	June 6/2010	1	5	6	4.0	12.7	42.8	1.8	0.6
May 31/2010	June 6/2010	1	5	6	4.2	12.5	39.1	2.0	0.6
May 31/2010	June 6/2010	1	5	2	3.2	11.0	35.0	1.5	0.6
May 31/2010	June 6/2010	1	5	2	4.0	10.5	30.9	1.2	0.6
May 31/2010	June 6/2010	1	5	4	NA	NA	NA	NA	NA
May 31/2010	June 6/2010	1	5	4	4.7	13.0	41.0	1.8	0.6
May 31/2010	June 6/2010	1	5	6	3.5	13.1	38.8	1.8	0.7
May 31/2010	June 6/2010	1	5	6	3.5	14.0	55.3	2.2	0.7
May 31/2010	June 6/2010	1	5	2	NA	NA	NA	NA	NA
May 31/2010	June 6/2010	1	5	2	3.3	9.1	29.8	4.1	0.5

May 31/2010	June 6/2010	1	5	4	3.1	10.0	27.5	1.3	0.6
May 31/2010	June 6/2010	1	5	4	4.5	13.3	41.0	1.8	0.7
May 31/2010	June 6/2010	1	5	6	4.5	11.5	29.8	1.4	0.6
May 31/2010	June 6/2010	1	5	6	18.2	24.2	27.5	1.5	0.6
May 31/2010	June 7/2010	1	5	2	2.2	9.8	37.2	1.6	0.6
May 31/2010	June 7/2010	1	5	2	1.8	7.8	35.5	1.0	0.6
May 31/2010	June 7/2010	1	5	4	3.1	10.9	39.8	1.6	0.7
May 31/2010	June 7/2010	1	5	4	NA	NA	NA	NA	NA
May 31/2010	June 7/2010	1	5	6	2.0	11.1	36.5	1.3	0.7
May 31/2010	June 7/2010	1	5	6	3.2	13.0	41.0	2.2	0.7
May 31/2010	June 7/2010	1	5	2	2.5	10.2	38.8	1.4	0.6
May 31/2010	June 7/2010	1	5	2	2.7	10.1	31.2	1.5	0.6
May 31/2010	June 7/2010	1	5	4	3.2	14.7	60.3	1.9	0.9
May 31/2010	June 7/2010	1	5	4	4.0	12.2	36.3	1.9	0.6
May 31/2010	June 7/2010	1	5	6	3.8	15.9	63.0	2.1	0.8
May 31/2010	June 7/2010	1	5	6	3.5	16.6	57.4	2.4	0.9
May 31/2010	June 7/2010	1	5	2	3.2	9.8	29.3	1.3	0.6
May 31/2010	June 7/2010	1	5	2	2.9	9.0	27.0	1.1	0.5
May 31/2010	June 7/2010	1	5	2	3.7	9.9	27.0	1.2	0.6
May 31/2010	June 7/2010	1	5	4	1.8	13.1	49.3	2.0	0.8
May 31/2010	June 7/2010	1	5	4	4.0	13.0	40.2	2.0	0.6
May 31/2010	June 7/2010	1	5	6	5.1	14.5	35.9	1.9	0.7
May 31/2010	June 7/2010	1	5	6	4.1	16.1	52.5	2.4	0.9
May 31/2010	June 7/2010	1	5	2	2.2	9.8	68.4	1.2	0.6
May 31/2010	June 7/2010	1	5	2	NA	NA	NA	NA	NA
May 31/2010	June 7/2010	1	5	4	3.6	12.8	36.0	2.1	0.7
May 31/2010	June 7/2010	1	5	4	5.7	11.7	28.2	1.2	0.5
May 31/2010	June 7/2010	1	5	6	4.4	11.2	26.8	1.7	0.6
May 31/2010	June 7/2010	1	5	6	2.8	9.8	27.5	1.5	0.6
May 31/2010	June 7/2010	1	5	2	3.3	11.3	47.5	1.3	0.7
May 31/2010	June 7/2010	1	5	2	3.2	11.5	52.5	1.6	0.6
May 31/2010	June 7/2010	1	5	4	3.9	13.3	65.0	1.5	0.7

May 31/2010	June 7/2010	1	5	4	3.6	13.4	45.5	2.1	0.7
May 31/2010	June 7/2010	1	5	6	3.8	14.5	54.0	2.3	0.8
May 31/2010	June 7/2010	1	5	6	3.4	12.9	50.9	1.6	0.7
May 31/2010	June 7/2010	1	5	2	3.5	10.7	46.5	1.1	0.6
May 31/2010	June 7/2010	1	5	2	2.9	9.8	31.5	1.5	0.6
May 31/2010	June 7/2010	1	5	4	4.5	14.0	47.5	2.1	0.7
May 31/2010	June 7/2010	1	5	4	4.5	15.4	50.5	2.1	0.7
May 31/2010	June 7/2010	1	5	6	3.5	14.5	53.5	2.0	0.8
May 31/2010	June 7/2010	1	5	6	3.5	16.4	83.5	2.2	1.1
June 1/2010	June 7/2010	1	5	2	2.9	13.3	68.5	1.7	0.8
June 1/2010	June 7/2010	1	5	2	2.5	12.5	55.1	1.5	0.8
June 1/2010	June 7/2010	1	5	4	4.0	12.7	49.2	1.6	0.7
June 1/2010	June 7/2010	1	5	4	3.2	15.8	88.8	1.7	0.6
June 1/2010	June 7/2010	1	5	6	4.6	14.8	NA	2.2	0.7
June 1/2010	June 7/2010	1	5	6	4.2	11.8	35.8	1.7	0.7
May 31/2010	June 7/2010	1	5	2	3.6	10.4	41.8	1.0	0.5
May 31/2010	June 7/2010	1	5	2	3.9	11.9	34.9	1.8	0.7
May 31/2010	June 7/2010	1	5	4	3.0	14.4	71.4	1.6	0.6
May 31/2010	June 7/2010	1	5	4	3.1	11.2	68.2	0.9	0.7
May 31/2010	June 7/2010	1	5	6	4.1	15.9	60.1	2.7	0.8
May 31/2010	June 7/2010	1	5	6	3.5	10.1	37.8	1.6	0.6
May 31/2010	June 7/2010	1	5	2	NA	NA	NA	NA	NA
May 31/2010	June 7/2010	1	5	2	NA	NA	NA	NA	NA
May 31/2010	June 7/2010	1	5	4	2.7	NA	NA	1.4	NA
May 31/2010	June 7/2010	1	5	4	3.6	14.1	20.2	2.0	0.6
May 31/2010	June 7/2010	1	5	6	1.8	7.6	NA	0.9	NA
May 31/2010	June 7/2010	1	5	6	1.0	9.0	NA	1.2	0.6
May 31/2010	June 7/2010	1	5	2	2.6	12.1	67.8	1.3	0.8
May 31/2010	June 7/2010	1	5	2	4.2	11.7	33.8	1.6	0.7
May 31/2010	June 7/2010	1	5	4	4.3	17.7	83.5	2.2	0.7
May 31/2010	June 7/2010	1	5	4	4.2	12.1	31.5	2.1	0.6
May 31/2010	June 7/2010	1	5	6	4.1	14.7	35.8	2.3	0.6

May 31/2010	June 7/2010	1	5	6	4.2	16.2	57.1	2.5	0.9
May 31/2010	June 7/2010	1	5	2	2.2	10.2	96.5	1.0	0.8
May 31/2010	June 7/2010	1	5	2	3.5	10.7	36.0	1.5	0.6
May 31/2010	June 7/2010	1	5	4	4.8	14.2	46.2	1.7	0.7
May 31/2010	June 7/2010	1	5	4	3.4	14.4	57.1	2.1	0.7
May 31/2010	June 7/2010	1	5	6	3.1	17.1	69.5	2.5	1.0
May 31/2010	June 7/2010	1	5	6	5.1	15.5	44.5	2.5	0.7
May 31/2010	June 7/2010	1	5	2	3.5	10.2	27.5	1.3	0.5
May 31/2010	June 7/2010	1	5	2	2.1	9.1	29.8	1.2	0.6
May 31/2010	June 7/2010	1	5	4	5.3	12.5	21.9	1.6	0.7
May 31/2010	June 7/2010	1	5	4	4.4	12.9	32.5	2.2	0.6
May 31/2010	June 7/2010	1	5	6	3.0	17.8	78.7	2.3	1.0
May 31/2010	June 7/2010	1	5	6	4.0	12.0	41.2	2.2	0.6
May 31/2010	June 7/2010	1	5	2	4.3	13.6	45.0	2.0	0.6
May 31/2010	June 7/2010	1	5	2	4.2	12.1	44.6	1.5	0.6
May 31/2010	June 7/2010	1	5	4	4.1	14.0	47.9	2.0	0.6
May 31/2010	June 7/2010	1	5	4	4.5	13.5	46.0	2.4	0.7
May 31/2010	June 7/2010	1	5	6	5.7	14.4	51.0	1.9	0.6
May 31/2010	June 7/2010	1	5	6	4.0	12.3	33.5	2.0	0.6
May 31/2010	June 7/2010	1	5	2	2.9	9.9	32.5	1.6	0.6
May 31/2010	June 7/2010	1	5	2	4.5	11.7	36.6	1.5	0.6
May 31/2010	June 7/2010	1	5	2	3.4	10.9	39.5	1.6	0.6
May 31/2010	June 7/2010	1	5	4	5.6	14.1	38.0	2.0	0.7
May 31/2010	June 7/2010	1	5	4	3.5	13.5	40.0	2.0	0.7
May 31/2010	June 7/2010	1	5	6	4.6	14.9	50.1	2.1	0.8
May 31/2010	June 7/2010	1	5	6	4.4	15.7	43.8	2.2	0.8
May 31/2010	June 7/2010	1	5	2	1.7	8.9	54.5	1.1	0.6
May 31/2010	June 7/2010	1	5	2	2.5	10.5	44.3	1.5	0.6
May 31/2010	June 7/2010	1	5	4	3.8	12.5	44.0	1.7	0.7
May 31/2010	June 7/2010	1	5	4	6.0	13.5	40.0	1.7	0.7
May 31/2010	June 7/2010	1	5	6	5.4	16.4	58.1	2.3	0.6
May 31/2010	June 7/2010	1	5	6	2.5	10.0	22.2	1.6	0.6

May 31/2010	June 7/2010	1	5	2	2.2	10.0	53.2	1.1	0.5
May 31/2010	June 7/2010	1	5	2	2.3	10.5	55.2	1.2	0.7
May 31/2010	June 7/2010	1	5	4	2.1	13.1	52.1	1.8	0.8
May 31/2010	June 7/2010	1	5	4	3.6	14.0	49.5	2.1	0.7
May 31/2010	June 7/2010	1	5	6	4.0	15.9	47.0	2.8	0.8
May 31/2010	June 7/2010	1	5	6	3.4	10.2	34.2	1.9	0.6
May 31/2010	June 7/2010	1	5	2	4.0	13.1	53.5	1.7	0.6
May 31/2010	June 7/2010	1	5	2	2.5	12.0	72.0	1.5	0.7
May 31/2010	June 7/2010	1	5	4	2.0	14.1	55.0	1.7	0.9
May 31/2010	June 7/2010	1	5	4	4.7	11.9	34.0	1.5	0.6
May 31/2010	June 7/2010	1	5	6	4.6	NA	NA	2.1	NA
May 31/2010	June 7/2010	1	5	6	4.1	16.2	66.5	2.2	1.0
May 31/2010	June 7/2010	1	5	2	3.6	10.1	39.5	1.0	0.6
May 31/2010	June 7/2010	1	5	2	3.7	10.5	31.0	1.3	0.6
May 31/2010	June 7/2010	1	5	4	4.5	16.5	91.1	2.1	1.0
May 31/2010	June 7/2010	1	5	4	3.1	13.6	53.5	2.2	0.7
May 31/2010	June 7/2010	1	5	6	5.3	15.5	58.5	2.2	0.8
May 31/2010	June 7/2010	1	5	6	4.0	12.2	37.0	2.1	0.6
May 31/2010	June 7/2010	1	5	2	3.0	9.5	27.2	1.2	0.6
May 31/2010	June 7/2010	1	5	2	3.6	10.3	34.3	1.4	0.6
May 31/2010	June 7/2010	1	5	4	3.0	12.6	57.5	1.8	0.6
May 31/2010	June 7/2010	1	5	4	3.6	13.9	53.8	1.8	0.7
May 31/2010	June 7/2010	1	5	6	4.7	NA	NA	0.8	NA
May 31/2010	June 7/2010	1	5	6	NA	NA	NA	NA	NA
May 31/2010	June 7/2010	1	5	2	2.5	8.0	29.0	1.0	0.5
May 31/2010	June 7/2010	1	5	2	2.0	10.0	59.5	1.2	0.6
May 31/2010	June 7/2010	1	5	4	4.0	11.4	34.7	1.5	0.6
May 31/2010	June 7/2010	1	5	4	4.7	12.5	39.8	2.2	0.7
May 31/2010	June 7/2010	1	5	6	2.5	15.0	72.0	2.1	1.0
May 31/2010	June 7/2010	1	5	6	4.1	10.3	30.0	1.3	0.6
June 1/2010	June 7/2010	1	5	2	2.6	7.6	21.1	0.8	0.5
June 1/2010	June 7/2010	1	5	2	3.4	10.4	35.5	1.4	0.6

June 1/2010	June 7/2010	1	5	4	3.4	10.2	37.5	1.5	0.5
June 1/2010	June 7/2010	1	5	4	3.0	12.0	34.0	2.0	0.6
June 1/2010	June 7/2010	1	5	6	5.2	11.6	25.5	0.8	0.5
June 1/2010	June 7/2010	1	5	6	5.8	13.0	49.1	2.0	0.6
June 1/2010	June 7/2010	1	5	2	2.7	9.0	37.5	1.2	0.6
June 1/2010	June 7/2010	1	5	2	2.1	9.4	30.9	1.2	0.7
June 1/2010	June 7/2010	1	5	4	2.7	10.4	34.8	2.0	0.7
June 1/2010	June 7/2010	1	5	4	2.9	9.2	18.9	1.2	0.5
June 1/2010	June 7/2010	1	5	6	2.2	10.5	34.5	1.7	0.7
June 1/2010	June 7/2010	1	5	6	2.0	9.5	21.0	1.5	0.7
June 1/2010	June 7/2010	1	5	2	2.0	8.5	22.0	1.1	0.6
June 1/2010	June 7/2010	1	5	2	2.2	9.1	24.0	1.1	0.6
June 1/2010	June 7/2010	1	5	4	2.9	11.3	31.3	1.8	0.6
June 1/2010	June 7/2010	1	5	4	3.6	13.5	35.5	2.0	0.6
June 1/2010	June 7/2010	1	5	6	3.1	13.7	45.5	2.0	0.8
June 1/2010	June 7/2010	1	5	6	2.6	9.9	26.5	1.5	0.6
June 1/2010	June 7/2010	1	5	2	2.2	8.5	23.1	1.3	0.6
June 1/2010	June 7/2010	1	5	2	2.5	8.6	20.2	1.2	0.6
June 1/2010	June 7/2010	1	5	4	3.6	10.2	33.2	1.2	0.6
June 1/2010	June 7/2010	1	5	4	3.9	10.2	32.3	1.2	0.6
June 1/2010	June 7/2010	1	5	6	2.0	9.6	19.5	1.6	0.6
June 1/2010	June 7/2010	1	5	6	3.5	11.2	35.5	1.2	0.6
June 1/2010	June 7/2010	1	5	2	1.9	8.6	19.1	1.2	0.6
June 1/2010	June 7/2010	1	5	2	2.6	8.9	27.5	1.1	0.6
June 1/2010	June 7/2010	1	5	4	3.6	9.9	28.2	1.5	0.6
June 1/2010	June 7/2010	1	5	4	3.9	9.2	29.6	1.5	0.6
June 1/2010	June 7/2010	1	5	6	2.0	10.4	24.5	1.6	0.6
June 1/2010	June 7/2010	1	5	6	2.7	9.5	37.0	1.0	0.6
June 1/2010	June 7/2010	1	5	2	2.1	10.0	35.8	1.3	0.7
June 1/2010	June 7/2010	1	5	2	2.7	10.0	27.1	1.4	0.6
June 1/2010	June 7/2010	1	5	4	2.8	10.4	29.8	1.7	0.7
June 1/2010	June 7/2010	1	5	4	NA	NA	NA	NA	NA

June 1/2010	June 7/2010	1	5	6	2.8	10.0	33.9	1.2	0.6
June 1/2010	June 7/2010	1	5	6	3.0	9.9	26.0	1.6	0.6
June 1/2010	June 7/2010	1	5	2	2.0	8.3	22.3	1.1	0.6
June 1/2010	June 7/2010	1	5	2	2.6	9.3	26.2	1.2	0.6
June 1/2010	June 7/2010	1	5	4	3.5	10.7	23.0	1.6	0.5
June 1/2010	June 7/2010	1	5	4	3.6	10.5	34.2	1.4	0.6
June 1/2010	June 7/2010	1	5	6	3.0	9.6	30.5	1.2	0.6
June 1/2010	June 7/2010	1	5	6	3.2	9.1	26.8	1.1	0.6
June 6/2010	June 21/2010	1	5	2	13.0	20.5	35.0	2.2	0.6
June 6/2010	June 21/2010	1	5	2	13.4	21.2	37.0	1.9	0.6
June 6/2010	June 21/2010	1	5	4	NA	NA	NA	NA	NA
June 6/2010	June 21/2010	1	5	4	19.5	NA	35.0	1.5	NA
June 6/2010	June 21/2010	1	5	6	NA	NA	NA	NA	NA
June 6/2010	June 21/2010	1	5	6	17.6	25.0	41.0	2.1	0.6
June 6/2010	June 21/2010	1	5	2	12.8	18.5	32.8	1.0	0.5
June 6/2010	June 21/2010	1	5	2	12.4	20.6	43.0	2.1	0.7
June 6/2010	June 21/2010	1	5	4	22.0	32.0	59.0	3.7	0.8
June 6/2010	June 21/2010	1	5	4	NA	NA	NA	NA	NA
June 6/2010	June 21/2010	1	5	6	9.2	15.0	26.0	1.6	0.6
June 6/2010	June 21/2010	1	5	6	25.0	32.1	56.8	1.7	0.7
June 6/2010	June 21/2010	1	5	2	11.3	19.8	43.8	2.3	0.7
June 6/2010	June 21/2010	1	5	2	13.8	22.0	40.5	2.0	0.7
June 6/2010	June 21/2010	1	5	4	24.5	38.0	55.0	3.6	1.0
June 6/2010	June 21/2010	1	5	4	NA	NA	NA	NA	NA
June 6/2010	June 21/2010	1	5	6	21.7	33.3	58.0	3.3	0.8
June 6/2010	June 21/2010	1	5	6	20.5	30.5	49.7	3.1	0.8
June 6/2010	June 21/2010	1	5	2	6.3	13.5	24.0	1.7	0.6
June 6/2010	June 21/2010	1	5	2	4.1	8.6	21.5	0.7	0.5
June 6/2010	June 21/2010	1	5	4	7.5	13.7	32.8	1.6	0.6
June 6/2010	June 21/2010	1	5	4	15.3	22.5	29.0	1.8	0.6
June 6/2010	June 21/2010	1	5	6	10.6	17.7	28.0	2.1	0.7
June 6/2010	June 21/2010	1	5	6	7.0	12.4	26.0	1.3	0.5

June 6/2010	June 21/2010	1	5	2	10.2	16.2	23.0	1.5	0.5
June 6/2010	June 21/2010	1	5	2	8.0	15.0	17.0	1.7	NA
June 6/2010	June 21/2010	1	5	4	7.5	14.0	23.5	1.6	0.6
June 6/2010	June 21/2010	1	5	4	13.3	20.6	27.0	2.1	0.7
June 6/2010	June 21/2010	1	5	6	NA	NA	NA	NA	NA
June 6/2010	June 21/2010	1	5	6	NA	NA	NA	NA	NA
June 6/2010	June 21/2010	1	5	2	4.6	9.1	15.9	0.8	0.5
June 6/2010	June 21/2010	1	5	2	5.0	9.3	15.0	0.7	0.5
June 6/2010	June 21/2010	1	5	4	18.4	31.7	88.2	3.2	0.9
June 6/2010	June 21/2010	1	5	4	16.7	28.4	58.0	3.2	0.7
June 6/2010	June 21/2010	1	5	6	13.0	19.7	28.2	1.8	0.6
June 6/2010	June 21/2010	1	5	6	20.0	28.0	51.1	1.5	0.6
June 6/2010	June 21/2010	1	5	2	5.6	17.8	72.5	2.8	0.7
June 6/2010	June 21/2010	1	5	2	8.1	17.9	56.2	2.1	0.6
June 6/2010	June 21/2010	1	5	4	14.9	26.3	48.1	3.2	0.8
June 6/2010	June 21/2010	1	5	4	18.6	30.5	53.2	3.6	0.8
June 6/2010	June 21/2010	1	5	6	21.0	31.0	43.5	2.8	0.7
June 6/2010	June 21/2010	1	5	6	18.2	27.3	38.5	2.6	0.7
June 6/2010	June 21/2010	1	5	2	8.0	14.6	23.0	1.2	0.5
June 6/2010	June 21/2010	1	5	2	10.7	16.5	23.0	1.2	0.5
June 6/2010	June 21/2010	1	5	4	16.6	29.4	56.5	4.0	0.9
June 6/2010	June 21/2010	1	5	4	22.0	32.0	47.5	3.8	1.0
June 6/2010	June 21/2010	1	5	6	25.6	40.8	63.0	4.2	0.9
June 6/2010	June 21/2010	1	5	6	22.6	32.3	44.0	2.6	0.7
June 6/2010	June 21/2010	1	5	2	6.8	18.7	35.0	1.6	0.7
June 6/2010	June 21/2010	1	5	2	9.5	15.5	33.0	1.3	0.5
June 6/2010	June 21/2010	1	5	4	17.8	26.0	38.5	2.2	0.7
June 6/2010	June 21/2010	1	5	4	9.8	15.1	25.5	1.3	0.5
June 6/2010	June 21/2010	1	5	6	10.9	18.6	29.1	2.3	0.6
June 6/2010	June 21/2010	1	5	6	NA	NA	NA	NA	NA
June 6/2010	June 21/2010	1	5	2	11.9	18.9	32.8	1.6	0.6
June 6/2010	June 21/2010	1	5	2	22.0	32.0	56.0	2.5	0.8

June 6/2010	June 21/2010	1	5	4	13.8	23.4	47.5	2.1	0.7
June 6/2010	June 21/2010	1	5	4	39.4	52.0	83.5	3.0	0.7
June 6/2010	June 21/2010	1	5	6	NA	NA	NA	NA	NA
June 6/2010	June 21/2010	1	5	6	25.6	31.9	45.5	1.5	0.6
June 6/2010	June 20/2010	1	5	2	5.5	11.3	21.5	1.1	0.5
June 6/2010	June 20/2010	1	5	2	14.4	22.4	41.8	1.9	0.7
June 6/2010	June 20/2010	1	5	4	17.0	25.3	46.5	2.2	0.6
June 6/2010	June 20/2010	1	5	4	23.4	31.7	55.5	2.6	0.6
June 6/2010	June 20/2010	1	5	6	16.1	21.4	28.7	1.2	0.6
June 6/2010	June 20/2010	1	5	6	NA	NA	NA	NA	NA
June 6/2010	June 20/2010	1	5	2	9.0	18.1	51.5	2.3	0.6
June 6/2010	June 20/2010	1	5	2	11.0	20.5	47.5	2.3	0.7
June 6/2010	June 20/2010	1	5	4	14.0	26.2	61.1	3.7	0.6
June 6/2010	June 20/2010	1	5	4	NA	NA	NA	NA	NA
June 6/2010	June 20/2010	1	5	6	18.6	32.8	59.5	4.5	0.8
June 6/2010	June 20/2010	1	5	6	17.3	24.2	36.5	2.1	0.6
June 6/2010	June 20/2010	1	5	2	NA	NA	NA	NA	NA
June 6/2010	June 20/2010	1	5	2	12.1	20.0	35.8	1.5	0.6
June 6/2010	June 20/2010	1	5	4	26.7	35.8	60.2	2.3	0.7
June 6/2010	June 20/2010	1	5	4	NA	NA	NA	NA	NA
June 6/2010	June 20/2010	1	5	6	17.0	27.5	46.5	2.7	0.8
June 6/2010	June 20/2010	1	5	6	27.6	38.2	59.8	3.0	0.7
June 6/2010	June 20/2010	1	5	2	14.2	21.2	40.3	1.5	0.6
June 6/2010	June 20/2010	1	5	2	NA	NA	NA	NA	NA
June 6/2010	June 20/2010	1	5	4	22.5	32.9	56.5	2.7	0.7
June 6/2010	June 20/2010	1	5	4	8.6	16.0	35.8	1.8	0.6
June 6/2010	June 20/2010	1	5	6	24.1	37.4	60.5	4.3	0.7
June 6/2010	June 20/2010	1	5	6	26.2	40.5	72.2	4.3	0.7
June 6/2010	June 20/2010	1	5	2	9.0	15.1	33.2	1.3	0.6
June 6/2010	June 20/2010	1	5	2	5.6	12.0	27.5	1.3	0.6
June 6/2010	June 20/2010	1	5	4	14.2	23.4	40.4	3.0	0.7
June 6/2010	June 20/2010	1	5	4	22.9	33.2	56.8	3.0	0.7

June 6/2010	June 20/2010	1	5	6	10.4	19.1	36.9	2.3	0.6
June 6/2010	June 20/2010	1	5	6	NA	NA	NA	NA	NA
June 7/2010	June 20/2010	1	5	2	8.2	12.3	40.6	2.4	0.6
June 7/2010	June 20/2010	1	5	2	4.5	9.9	19.2	1.2	0.5
June 7/2010	June 20/2010	1	5	4	13.3	23.3	50.7	2.6	0.7
June 7/2010	June 20/2010	1	5	4	9.3	15.2	26.2	1.3	0.5
June 7/2010	June 20/2010	1	5	6	16.4	32.4	57.5	5.2	0.7
June 7/2010	June 20/2010	1	5	6	24.2	37.0	65.0	4.2	0.6
June 7/2010	June 20/2010	1	5	2	8.8	17.5	33.0	2.1	0.7
June 7/2010	June 20/2010	1	5	2	9.4	17.5	35.0	2.2	0.6
June 7/2010	June 20/2010	1	5	4	16.0	33.8	74.5	5.2	1.0
June 7/2010	June 20/2010	1	5	4	19.1	28.2	49.4	2.5	0.7
June 7/2010	June 20/2010	1	5	6	22.9	39.5	81.1	4.2	0.9
June 7/2010	June 20/2010	1	5	6	23.1	41.5	81.5	4.9	0.9
June 7/2010	June 20/2010	1	5	2	9.8	16.8	31.5	1.7	0.6
June 7/2010	June 20/2010	1	5	2	5.2	11.7	29.1	1.5	0.6
June 7/2010	June 20/2010	1	5	4	10.0	19.9	50.2	2.4	0.7
June 7/2010	June 20/2010	1	5	4	14.2	24.2	48.5	2.7	0.7
June 7/2010	June 20/2010	1	5	6	22.4	33.0	47.5	2.7	0.7
June 7/2010	June 20/2010	1	5	6	NA	NA	NA	NA	NA
June 7/2010	June 20/2010	1	5	2	7.5	16.4	64.2	2.2	0.7
June 7/2010	June 20/2010	1	5	2	4.6	11.0	30.5	1.2	0.6
June 7/2010	June 20/2010	1	5	4	15.0	25.7	45.5	3.1	0.7
June 7/2010	June 20/2010	1	5	4	16.1	21.4	32.1	1.3	0.6
June 7/2010	June 20/2010	1	5	6	20.9	28.0	44.5	1.6	0.6
June 7/2010	June 20/2010	1	5	6	18.5	25.9	39.1	2.1	0.6
June 7/2010	June 21/2010	1	5	2	12.0	21.5	50.0	2.3	0.7
June 7/2010	June 21/2010	1	5	2	11.1	20.9	60.0	2.6	0.6
June 7/2010	June 21/2010	1	5	4	21.5	35.4	76.2	3.9	0.8
June 7/2010	June 21/2010	1	5	4	20.4	31.7	61.2	2.9	0.7
June 7/2010	June 21/2010	1	5	6	26.4	41.1	76.8	4.5	0.8
June 7/2010	June 21/2010	1	5	6	22.4	35.1	73.1	3.8	0.8

June 7/2010	June 21/2010	1	5	2	12.2	21.8	53.5	1.6	0.6
June 7/2010	June 21/2010	1	5	2	7.6	15.0	34.8	1.6	0.6
June 7/2010	June 21/2010	1	5	4	22.0	33.5	61.0	3.2	0.7
June 7/2010	June 21/2010	1	5	4	8.5	12.6	34.0	2.6	0.6
June 7/2010	June 21/2010	1	5	6	21.0	36.1	69.0	4.0	1.0
June 7/2010	June 21/2010	1	5	6	NA	NA	NA	NA	NA
June 7/2010	June 21/2010	1	5	2	9.7	24.4	66.8	3.6	1.0
June 7/2010	June 21/2010	1	5	2	13.1	28.8	65.0	3.7	0.8
June 7/2010	June 21/2010	1	5	4	23.1	34.1	63.8	2.7	0.7
June 7/2010	June 21/2010	1	5	4	11.7	22.2	47.0	2.7	0.8
June 7/2010	June 21/2010	1	5	6	14.5	25.8	61.0	2.3	0.8
June 7/2010	June 21/2010	1	5	6	25.0	33.2	57.0	2.1	0.7
June 7/2010	June 21/2010	1	5	2	8.5	16.0	33.0	1.4	0.6
June 7/2010	June 21/2010	1	5	2	NA	NA	NA	NA	NA
June 7/2010	June 21/2010	1	5	4	15.2	36.0	89.5	5.8	0.6
June 7/2010	June 21/2010	1	5	4	20.0	27.6	45.7	1.8	0.6
June 7/2010	June 21/2010	1	5	6	23.3	39.2	80.0	5.2	0.9
June 7/2010	June 21/2010	1	5	6	17.8	26.5	50.0	2.7	0.6
June 7/2010	June 21/2010	1	5	2	6.6	16.0	45.0	2.1	0.8
June 7/2010	June 21/2010	1	5	2	9.1	20.6	49.2	2.9	0.8
June 7/2010	June 21/2010	1	5	4	10.5	23.2	50.0	3.7	0.7
June 7/2010	June 21/2010	1	5	4	12.3	20.6	41.0	2.1	0.7
June 7/2010	June 21/2010	1	5	6	11.2	19.3	39.5	1.9	0.7
June 7/2010	June 21/2010	1	5	6	7.8	24.7	67.0	4.3	1.1
June 7/2010	June 21/2010	1	5	2	4.5	11.6	30.5	1.5	0.6
June 7/2010	June 21/2010	1	5	2	NA	NA	NA	NA	NA
June 7/2010	June 21/2010	1	5	4	11.0	24.2	60.0	3.1	0.7
June 7/2010	June 21/2010	1	5	4	13.5	24.7	54.0	2.6	0.7
June 7/2010	June 21/2010	1	5	6	21.5	32.6	51.5	2.7	0.6
June 7/2010	June 21/2010	1	5	6	25.8	38.5	71.7	3.6	0.9
June 7/2010	June 21/2010	1	5	2	6.8	18.6	100.0	2.8	1.0
June 7/2010	June 21/2010	1	5	2	9.9	17.7	37.5	1.7	0.6

June 7/2010	June 21/2010	1	5	4	19.2	30.2	55.8	3.0	0.7
June 7/2010	June 21/2010	1	5	4	12.2	33.6	71.3	7.5	0.8
June 7/2010	June 21/2010	1	5	6	22.2	44.5	75.1	7.5	1.0
June 7/2010	June 21/2010	1	5	6	27.0	38.3	53.0	3.0	37.0
June 7/2010	June 21/2010	1	5	2	8.7	15.8	29.5	1.6	0.6
June 7/2010	June 21/2010	1	5	2	7.1	15.6	34.2	2.3	0.6
June 7/2010	June 21/2010	1	5	4	18.4	25.9	42.0	1.8	0.7
June 7/2010	June 21/2010	1	5	4	18.5	25.8	38.5	1.9	0.6
June 7/2010	June 21/2010	1	5	6	23.2	47.4	100.0	7.2	1.1
June 7/2010	June 21/2010	1	5	6	5.9	16.7	49.8	2.3	0.7
June 7/2010	June 21/2010	1	5	2	7.8	15.5	36.0	1.9	0.6
June 7/2010	June 21/2010	1	5	2	14.8	23.6	54.0	2.2	0.7
June 7/2010	June 21/2010	1	5	4	23.7	35.0	64.0	2.8	0.7
June 7/2010	June 21/2010	1	5	4	12.5	22.7	42.0	2.2	0.6
June 7/2010	June 21/2010	1	5	6	28.5	38.0	74.0	2.5	0.7
June 7/2010	June 21/2010	1	5	6	25.5	34.3	56.0	2.7	0.7
June 7/2010		1	5	2	NA	NA	NA	NA	NA
June 7/2010		1	5	2	NA	NA	NA	NA	NA
June 7/2010		1	5	4	NA	NA	NA	NA	NA
June 7/2010		1	5	4	NA	NA	NA	NA	NA
June 7/2010		1	5	6	NA	NA	NA	NA	NA
June 7/2010		1	5	6	NA	NA	NA	NA	NA
June 7/2010	June 21/2010	1	5	2	6.2	15.3	52.2	2.0	0.7
June 7/2010	June 21/2010	1	5	2	8.1	18.1	40.5	2.1	0.7
June 7/2010	June 21/2010	1	5	4	18.2	30.1	55.1	3.1	0.7
June 7/2010	June 21/2010	1	5	4	19.0	29.7	55.5	3.0	0.7
June 7/2010	June 21/2010	1	5	6	25.6	88.1	78.0	3.6	0.8
June 7/2010	June 21/2010	1	5	6	10.3	17.0	34.0	1.7	0.7
June 7/2010	June 21/2010	1	5	2	8.5	19.9	49.8	2.6	0.6
June 7/2010	June 21/2010	1	5	2	7.1	18.2	49.5	2.8	0.7
June 7/2010	June 21/2010	1	5	4	18.2	29.5	54.2	3.3	0.7
June 7/2010	June 21/2010	1	5	4	15.2	32.9	65.5	6.0	0.8

June 7/2010	June 21/2010	1	5	6	NA	NA	NA	NA	NA
June 7/2010	June 21/2010	1	5	6	NA	NA	NA	NA	NA
June 7/2010	June 21/2010	1	5	2	28.9	30.4	59.5	2.8	0.7
June 7/2010	June 21/2010	1	5	2	12.7	27.8	74.2	4.1	0.8
June 7/2010	June 21/2010	1	5	4	19.3	39.1	60.1	6.3	1.0
June 7/2010	June 21/2010	1	5	4	21.9	29.1	36.1	2.1	0.6
June 7/2010	June 21/2010	1	5	6	11.9	22.1	45.2	2.5	0.7
June 7/2010	June 21/2010	1	5	6	10.7	23.1	52.0	3.5	0.7
June 7/2010	June 21/2010	1	5	2	12.0	19.0	40.0	1.3	0.7
June 7/2010	June 21/2010	1	5	2	12.9	20.2	31.9	1.7	0.6
June 7/2010	June 21/2010	1	5	4	27.8	47.0	113.0	5.2	1.0
June 7/2010	June 21/2010	1	5	4	20.8	37.0	71.0	5.0	0.7
June 7/2010	June 21/2010	1	5	6	28.6	41.0	67.0	3.0	0.9
June 7/2010	June 21/2010	1	5	6	19.1	26.6	32.9	2.1	0.8
June 7/2010	June 21/2010	1	5	2	7.6	15.0	30.0	1.5	0.5
June 7/2010	June 21/2010	1	5	2	12.3	18.6	36.0	1.4	0.5
June 7/2010	June 21/2010	1	5	4	17.5	30.4	69.2	3.5	0.7
June 7/2010	June 21/2010	1	5	4	20.0	33.2	64.5	3.6	0.7
June 7/2010	June 21/2010	1	5	6	5.8	17.7	41.0	2.8	0.7
June 7/2010	June 21/2010	1	5	6	10.8	23.7	44.5	3.6	0.8
June 7/2010	June 21/2010	1	5	2	6.4	12.2	32.0	1.2	0.6
June 7/2010	June 21/2010	1	5	2	7.2	17.9	55.5	3.0	0.6
June 7/2010	June 21/2010	1	5	4	16.3	24.7	45.5	2.1	0.7
June 7/2010	June 21/2010	1	5	4	17.3	28.1	52.0	2.5	0.6
June 7/2010	June 21/2010	1	5	6	14.1	37.2	34.5	6.7	1.0
June 7/2010	June 21/2010	1	5	6	8.1	19.8	50.5	2.8	0.7
June 7/2010	June 21/2010	1	5	2	6.0	11.0	22.0	1.0	0.5
June 7/2010	June 21/2010	1	5	2	9.7	12.0	37.5	1.8	0.6
June 7/2010	June 21/2010	1	5	4	11.6	18.4	42.0	1.8	0.5
June 7/2010	June 21/2010	1	5	4	6.8	13.7	27.8	1.5	0.6
June 7/2010	June 21/2010	1	5	6	6.0	16.4	41.8	2.7	0.7
June 7/2010	June 21/2010	1	5	6	20.0	27.3	59.8	1.6	0.6

June 7/2010	June 20/2010	1	5	2	8.0	15.4	31.5	1.8	0.6
June 7/2010	June 20/2010	1	5	2	8.2	17.0	32.2	2.1	0.7
June 7/2010	June 20/2010	1	5	4	6.0	14.7	37.0	1.8	0.7
June 7/2010	June 20/2010	1	5	4	8.1	14.2	24.0	1.5	0.6
June 7/2010	June 20/2010	1	5	6	12.6	24.5	46.8	3.8	0.8
June 7/2010	June 20/2010	1	5	6	8.9	18.4	48.5	2.5	0.7
June 7/2010	June 20/2010	1	5	2	6.8	14.4	25.4	1.7	0.6
June 7/2010	June 20/2010	1	5	2	7.8	15.8	31.0	2.0	0.6
June 7/2010	June 20/2010	1	5	4	10.2	20.4	37.5	2.8	0.6
June 7/2010	June 20/2010	1	5	4	15.2	27.6	46.6	3.6	0.6
June 7/2010	June 20/2010	1	5	6	21.5	38.9	65.0	4.1	1.0
June 7/2010	June 20/2010	1	5	6	12.0	21.8	36.8	2.7	0.7
June 7/2010	June 20/2010	1	5	2	7.7	14.9	29.2	1.9	0.7
June 7/2010	June 20/2010	1	5	2	6.6	13.3	23.8	1.6	0.7
June 7/2010	June 20/2010	1	5	4	10.1	12.5	34.1	1.6	0.6
June 7/2010	June 20/2010	1	5	4	10.7	17.5	37.5	1.5	0.5
June 7/2010	June 20/2010	1	5	6	14.0	22.7	30.8	2.2	0.7
June 7/2010	June 20/2010	1	5	6	16.8	26.0	49.5	2.2	0.7
June 7/2010	June 20/2010	1	5	2	4.1	10.7	36.8	1.2	0.6
June 7/2010	June 20/2010	1	5	2	6.8	13.6	28.0	1.6	0.7
June 7/2010	June 20/2010	1	5	4	10.8	18.0	34.5	1.8	0.6
June 7/2010	June 20/2010	1	5	4	12.0	19.2	36.1	1.9	0.6
June 7/2010	June 20/2010	1	5	6	13.1	22.9	35.7	2.5	0.6
June 7/2010	June 20/2010	1	5	6	8.0	17.3	40.3	2.2	0.7
June 7/2010	June 20/2010	1	5	2	7.4	17.7	40.0	2.2	0.9
June 7/2010	June 20/2010	1	5	2	8.3	16.1	29.4	1.9	0.7
June 7/2010	June 20/2010	1	5	4	11.6	20.1	33.5	2.6	0.7
June 7/2010	June 20/2010	1	5	4	6.5	14.5	33.9	2.0	0.7
June 7/2010	June 20/2010	1	5	6	14.5	23.0	47.0	1.8	0.7
June 7/2010	June 20/2010	1	5	6	13.4	21.9	34.0	2.8	0.6
June 7/2010	June 20/2010	1	5	2	5.5	12.6	25.5	1.5	0.6
June 7/2010	June 20/2010	1	5	2	6.9	14.1	28.4	1.7	0.6

June 7/2010	June 20/2010	1	5	4	12.2	19.8	31.5	2.0	0.5
June 7/2010	June 20/2010	1	5	4	12.6	20.3	40.0	1.8	0.6
June 7/2010	June 20/2010	1	5	6	13.0	20.8	40.8	1.8	0.6
June 7/2010	June 20/2010	1	5	6	15.6	22.7	38.8	1.6	0.6
June 7/2010	June 20/2010	1	5	2	3.6	10.7	37.5	1.7	0.6
June 7/2010	June 20/2010	1	5	2	9.2	14.7	32.0	1.1	0.5
Jun 7/2010	June 20/2010	1	5	4	7.0	14.5	39.2	1.8	0.6
Jun 7/2010	June 20/2010	1	5	4	6.0	12.2	27.8	1.5	0.6
Jun 7/2010	June 20/2010	1	5	6	5.6	14.9	39.8	2.2	0.7
Jun 7/2010	June 20/2010	1	5	6	6.2	15.7	43.5	2.4	0.6
Jun 7/2010	June 21/2010	1	5	2	7.5	13.5	28.5	1.4	0.5
Jun 7/2010	June 21/2010	1	5	2	7.5	14.5	41.5	1.6	0.6
Jun 7/2010	June 21/2010	1	5	4	12.9	21.3	48.5	2.2	0.6
Jun 7/2010	June 21/2010	1	5	4	6.5	13.6	35.9	1.7	0.5
Jun 7/2010	June 21/2010	1	5	6	17.0	24.7	49.8	1.7	0.6
Jun 7/2010	June 21/2010	1	5	6	17.3	26.6	59.0	2.6	0.7
June 21/2010	July4/2010	3	5	2	8.0	10.1	22.7	0.5	0.5
June 21/2010	July4/2010	3	5	2	10.1	12.5	44.1	0.7	0.6
June 21/2010	July4/2010	3	5	4	8.5	10.7	20.1	0.5	0.5
June 21/2010	July4/2010	3	5	4	9.6	11.7	25.1	0.7	0.5
June 21/2010	July4/2010	3	5	6	10.9	12.9	31.1	0.6	0.6
June 21/2010	July4/2010	3	5	6	13.5	16.7	49.6	1.2	0.7
June 21/2010	July5/2010	3	5	2	9.0	11.3	38.0	0.7	0.5
June 21/2010	July5/2010	3	5	2	9.3	11.9	46.5	0.7	0.6
June 21/2010	July5/2010	3	5	4	8.4	10.5	20.8	0.6	0.6
June 21/2010	July5/2010	3	5	4	8.0	10.4	23.7	0.6	0.6
June 21/2010	July5/2010	3	5	6	12.2	14.6	30.5	0.8	0.6
June 21/2010	July5/2010	3	5	6	6.5	8.5	19.4	0.6	0.6
June 21/2010	July5/2010	3	5	2	9.4	11.7	42.5	0.7	0.6
June 21/2010	July5/2010	3	5	2	10.5	13.0	43.0	0.8	0.6
June 21/2010	July5/2010	3	5	4	15.5	29.4	48.2	1.5	0.8
June 21/2010	July5/2010	3	5	4	NA	NA	NA	NA	NA

June 21/2010	July5/2010	3	5	6	9.6	12.0	26.5	0.7	0.6
June 21/2010	July5/2010	3	5	6	13.2	17.2	59.8	1.1	0.7
June 21/2010	July5/2010	3	5	2	7.4	9.4	26.1	0.6	0.5
June 21/2010	July5/2010	3	5	2	8.8	11.0	28.8	0.6	0.6
June 21/2010	July5/2010	3	5	4	7.3	9.4	14.7	0.7	0.6
June 21/2010	July5/2010	3	5	4	10.7	13.9	39.2	1.0	0.7
June 21/2010	July5/2010	3	5	6	12.0	14.7	38.2	0.9	0.6
June 21/2010	July5/2010	3	5	6	7.6	9.6	23.8	0.6	0.6
June 21/2010	July5/2010	3	5	2	17.3	15.4	45.3	1.0	0.7
June 21/2010	July5/2010	3	5	2	11.2	14.2	39.8	1.0	0.8
June 21/2010	July5/2010	3	5	4	8.3	10.5	23.4	0.6	0.5
June 21/2010	July5/2010	3	5	4	8.3	10.3	27.5	0.6	0.6
June 21/2010	July5/2010	3	5	6	11.6	14.5	48.2	0.9	0.7
June 21/2010	July5/2010	3	5	6	10.3	12.7	38.2	0.7	0.6
June 21/2010	July5/2010	3	5	2	12.3	15.3	37.2	0.9	0.7
June 21/2010	July5/2010	3	5	2	10.9	13.6	43.5	1.0	0.7
June 21/2010	July5/2010	3	5	4	11.7	14.8	45.5	1.0	0.7
June 21/2010	July5/2010	3	5	4	11.3	14.0	62.5	1.0	0.7
June 21/2010	July5/2010	3	5	6	10.0	12.4	33.5	0.7	0.6
June 21/2010	July5/2010	3	5	6	9.9	12.2	35.4	0.6	0.6
June 21/2010	July5/2010	3	5	2	8.5	11.3	24.5	0.8	0.7
June 21/2010	July5/2010	3	5	2	4.1	6.3	44.1	0.6	0.6
June 21/2010	July5/2010	3	5	4	9.5	12.4	24.2	0.9	0.6
June 21/2010	July5/2010	3	5	4	11.0	14.0	52.5	1.0	0.7
June 21/2010	July5/2010	3	5	6	14.5	17.8	57.3	1.1	0.7
June 21/2010	July5/2010	3	5	6	13.8	16.7	48.2	1.0	0.7
June 21/2010	July5/2010	3	5	2	7.2	9.4	18.5	0.6	0.6
June 21/2010	July5/2010	3	5	2	7.2	9.2	20.2	0.6	0.5
June 21/2010	July5/2010	3	5	4	10.9	14.9	29.8	1.2	0.7
June 21/2010	July5/2010	3	5	4	13.8	17.7	55.1	1.5	0.8
June 21/2010	July5/2010	3	5	6	12.7	15.5	39.2	1.0	0.6
June 21/2010	July5/2010	3	5	6	14.5	18.3	55.1	1.2	0.7

June 21/2010	July5/2010	3	5	2	9.1	11.2	28.0	0.7	0.6
June 21/2010	July5/2010	3	5	2	9.5	11.5	24.8	0.5	0.5
June 21/2010	July5/2010	3	5	4	12.5	15.4	49.5	1.0	0.6
June 21/2010	July5/2010	3	5	4	10.1	12.1	28.0	0.6	0.6
June 21/2010	July5/2010	3	5	6	9.7	12.2	27.2	0.8	0.6
June 21/2010	July5/2010	3	5	6	9.2	11.4	23.1	0.7	0.7
June 21/2010	July5/2010	3	5	2	10.2	12.4	28.5	0.7	0.5
June 21/2010	July5/2010	3	5	2	15.0	18.2	62.8	1.1	0.7
June 21/2010	July5/2010	3	5	4	15.7	18.3	40.3	0.8	0.6
June 21/2010	July5/2010	3	5	4	13.2	16.2	41.0	1.0	0.7
June 21/2010	July5/2010	3	5	6	11.0	13.4	28.8	0.9	0.7
June 21/2010	July5/2010	3	5	6	11.2	13.5	32.4	0.8	0.7
June 20/2010	July5/2010	3	5	2	13.2	15.8	36.3	0.8	0.6
June 20/2010	July5/2010	3	5	2	11.0	13.4	30.5	0.8	0.5
June 20/2010	July5/2010	3	5	4	15.3	18.6	47.5	1.0	0.7
June 20/2010	July5/2010	3	5	4	15.2	18.4	45.3	1.1	0.8
June 20/2010	July5/2010	3	5	6	14.2	16.7	33.2	0.7	0.5
June 20/2010	July5/2010	3	5	6	15.4	18.7	48.1	1.1	0.7
June 20/2010	July5/2010	3	5	2	6.2	8.5	45.5	0.6	0.5
June 20/2010	July5/2010	3	5	2	10.6	13.2	46.2	0.7	0.6
June 20/2010	July5/2010	3	5	4	11.0	13.9	34.2	0.7	0.6
June 20/2010	July5/2010	3	5	4	10.6	13.0	29.6	0.6	0.6
June 20/2010	July5/2010	3	5	6	16.4	19.9	50.1	1.0	0.7
June 20/2010	July5/2010	3	5	6	17.1	20.1	40.1	0.9	0.6
June 20/2010	July5/2010	3	5	2	10.5	12.7	27.1	0.6	0.5
June 20/2010	July5/2010	3	5	2	10.5	12.6	31.1	0.6	0.5
June 20/2010	July5/2010	3	5	4	17.3	29.0	64.2	1.3	0.7
June 20/2010	July5/2010	3	5	4	17.2	20.5	47.2	1.1	0.7
June 20/2010	July5/2010	3	5	6	15.8	18.2	29.1	0.7	0.5
June 20/2010	July5/2010	3	5	6	11.8	15.2	58.2	1.1	0.8
June 20/2010	July5/2010	3	5	2	11.5	14.1	43.2	0.8	0.6
June 20/2010	July5/2010	3	5	2	10.5	13.0	29.0	0.7	0.6

June 20/2010	July5/2010	3	5	4	16.0	19.6	56.4	0.9	0.7
June 20/2010	July5/2010	3	5	4	11.3	13.7	28.7	0.7	0.5
June 20/2010	July5/2010	3	5	6	18.7	24.6	79.4	2.0	1.0
June 20/2010	July5/2010	3	5	6	NA	NA	NA	NA	NA
June 20/2010	July5/2010	3	5	2	6.5	8.6	26.0	0.5	0.5
June 20/2010	July5/2010	3	5	2	NA	NA	NA	NA	NA
June 20/2010	July5/2010	3	5	4	12.3	14.5	41.5	0.7	0.5
June 20/2010	July5/2010	3	5	4	10.1	12.3	27.2	0.6	0.5
June 20/2010	July5/2010	3	5	6	11.6	14.5	37.5	0.9	0.5
June 20/2010	July5/2010	3	5	6	16.0	20.5	64.5	1.4	0.8
June 20/2010	July5/2010	3	5	8	14.4	21.1	22.0	2.0	0.8
June 20/2010	July5/2010	3	5	2	9.0	11.2	39.0	0.7	0.7
June 20/2010	July5/2010	3	5	2	10.0	12.2	21.3	0.5	0.5
June 20/2010	July5/2010	3	5	4	15.2	18.3	54.0	1.0	0.5
June 20/2010	July5/2010	3	5	4	11.3	13.9	38.0	0.9	0.6
June 20/2010	July5/2010	3	5	6	13.9	16.6	42.5	0.9	0.7
June 20/2010	July5/2010	3	5	6	22.9	27.6	71.1	1.4	0.9
June 20/2010	July5/2010	3	5	2	9.0	11.2	25.3	0.7	0.5
June 20/2010	July5/2010	3	5	2	7.1	9.8	25.3	0.7	0.5
June 20/2010	July5/2010	3	5	4	11.3	20.0	84.2	2.3	1.0
June 20/2010	July5/2010	3	5	4	13.0	14.3	48.2	1.1	0.7
June 20/2010	July5/2010	3	5	6	12.0	17.3	88.9	1.7	1.0
June 20/2010	July5/2010	3	5	6	19.8	25.8	96.2	1.9	0.6
June 20/2010	July5/2010	3	5	2	6.8	10.1	18.6	0.6	0.5
June 20/2010	July5/2010	3	5	2	7.6	9.8	24.8	0.7	0.5
June 20/2010	July5/2010	3	5	4	12.6	15.4	39.5	0.9	0.6
June 20/2010	July5/2010	3	5	4	11.8	14.2	32.8	0.7	0.6
June 20/2010	July5/2010	3	5	6	18.5	22.1	65.1	1.5	0.9
June 20/2010	July5/2010	3	5	6	19.3	23.8	63.2	1.4	0.9
June 20/2010	July5/2010	3	5	2	10.5	12.6	19.0	0.6	0.6
June 20/2010	July5/2010	3	5	2	NA	NA	NA	NA	NA
June 20/2010	July5/2010	3	5	4	11.5	14.3	47.2	0.9	0.6

June 20/2010	July5/2010	3	5	4	10.6	14.5	32.2	1.0	0.5
June 20/2010	July5/2010	3	5	6	17.9	21.2	54.5	1.1	0.7
June 20/2010	July5/2010	3	5	6	15.0	18.5	37.6	1.1	0.7
June 21/2010	July5/2010	3	5	2	10.7	13.6	49.1	0.8	0.7
June 21/2010	July5/2010	3	5	2	9.2	12.0	37.4	0.9	0.6
June 21/2010	July5/2010	3	5	4	15.6	19.5	56.8	1.3	0.8
June 21/2010	July5/2010	3	5	4	13.5	17.7	66.8	1.3	0.8
June 21/2010	July5/2010	3	5	6	20.0	27.0	88.3	2.3	1.2
June 21/2010	July5/2010	3	5	6	16.5	20.5	47.1	1.2	0.7
June 21/2010	July5/2010	3	5	2	9.1	12.2	43.3	0.9	0.6
June 21/2010	July5/2010	3	5	2	10.9	13.3	32.5	0.7	0.5
June 21/2010	July5/2010	3	5	4	14.2	18.4	56.1	1.5	0.7
June 21/2010	July5/2010	3	5	4	13.0	15.8	39.2	0.9	0.6
June 21/2010	July5/2010	3	5	6	18.2	24.2	82.3	1.9	1.0
June 21/2010	July5/2010	3	5	6	13.7	17.0	42.5	1.1	0.8
June 21/2010	July4/2010	3	5	2	12.0	14.1	29.5	0.7	0.5
June 21/2010	July4/2010	3	5	2	10.4	14.3	60.0	1.2	0.8
June 21/2010	July4/2010	3	5	4	10.0	16.7	71.0	2.2	1.1
June 21/2010	July4/2010	3	5	4	13.5	17.2	49.0	1.3	0.9
June 21/2010	July4/2010	3	5	6	13.2	16.5	38.0	1.2	0.7
June 21/2010	July4/2010	3	5	6	14.5	19.0	54.0	1.5	1.0
June 21/2010	July5/2010	3	5	2	12.1	14.6	38.1	0.9	0.6
June 21/2010	July5/2010	3	5	2	10.0	12.9	34.5	0.9	0.6
June 21/2010	July5/2010	3	5	4	15.5	20.1	85.5	1.5	1.0
June 21/2010	July5/2010	3	5	4	13.4	16.6	45.2	1.1	0.6
June 21/2010	July5/2010	3	5	6	17.5	22.8	88.1	1.8	1.0
June 21/2010	July5/2010	3	5	6	16.2	19.8	59.0	1.1	0.7
June 21/2010	July5/2010	3	5	8	57.8	71.7	100.0	5.0	1.0
June 21/2010	July4/2010	3	5	2	9.7	12.5	39.0	0.9	0.6
June 21/2010	July4/2010	3	5	2	11.4	14.9	59.5	1.1	0.7
June 21/2010	July4/2010	3	5	4	15.4	19.5	63.3	1.3	0.8
June 21/2010	July4/2010	3	5	4	14.0	17.4	50.0	1.6	0.7

June 21/2010	July4/2010	3	5	6	14.5	17.8	47.2	1.1	0.7
June 21/2010	July4/2010	3	5	6	21.7	26.6	87.2	1.7	1.0
June 21/2010	July4/2010	3	5	2	8.5	10.9	27.0	0.6	0.5
June 21/2010	July4/2010	3	5	2	10.2	12.5	38.3	0.7	0.5
June 21/2010	July4/2010	3	5	4	14.4	19.1	73.1	1.6	0.8
June 21/2010	July4/2010	3	5	4	15.6	19.8	62.9	1.4	0.8
June 21/2010	July4/2010	3	5	6	14.9	19.4	56.0	1.3	0.7
June 21/2010	July4/2010	3	5	6	13.3	16.0	35.0	0.8	0.6
June 21/2010	July4/2010	3	5	8	48.5	57.1	65.0	2.5	0.6
June 21/2010	July4/2010	3	5	2	5.2	7.5	35.2	0.6	0.5
June 21/2010	July4/2010	3	5	2	9.3	12.3	42.0	0.9	0.6
June 21/2010	July4/2010	3	5	4	11.7	15.6	54.0	1.3	0.7
June 21/2010	July4/2010	3	5	4	11.0	14.1	43.0	1.0	0.7
June 21/2010	July4/2010	3	5	6	19.3	23.9	68.0	1.5	0.9
June 21/2010	July4/2010	3	5	6	13.8	16.7	43.0	0.8	0.6
June 21/2010	July4/2010	3	5	2	4.5	6.6	19.0	0.5	0.5
June 21/2010	July4/2010	3	5	2	6.6	8.8	25.3	0.6	0.5
June 21/2010	July4/2010	3	5	4	12.5	15.5	40.0	1.0	0.6
June 21/2010	July4/2010	3	5	4	11.7	14.6	37.5	0.8	0.6
June 21/2010	July4/2010	3	5	6	15.5	19.3	47.5	1.4	0.8
June 21/2010	July4/2010	3	5	6	14.6	23.3	62.1	1.5	0.9
June 21/2010	July4/2010	3	5	2	11.5	13.7	36.8	0.7	0.5
June 21/2010	July4/2010	3	5	2	10.0	12.6	53.0	0.6	0.8
June 21/2010	July4/2010	3	5	4	15.1	18.1	52.0	1.1	0.8
June 21/2010	July4/2010	3	5	4	12.7	16.1	50.5	1.0	0.7
June 21/2010	July4/2010	3	5	6	16.9	32.0	80.0	1.9	1.0
June 21/2010	July4/2010	3	5	6	18.7	23.2	63.0	1.6	0.8
June 7/2010	July4/2010	3	5	2	18.9	26.7	36.2	1.8	0.6
June 7/2010	July4/2010	3	5	2	21.4	29.8	41.5	2.2	0.7
June 7/2010	July4/2010	3	5	4	33.2	42.1	50.1	2.2	0.6
June 7/2010	July4/2010	3	5	4	28.9	40.2	52.0	3.1	0.7
June 7/2010	July4/2010	3	5	6	43.8	53.0	83.0	3.2	0.8

June 7/2010	July4/2010	3	5	6	25.0	33.6	47.0	2.1	0.6
June 21/2010	July4/2010	3	5	2	8.9	11.4	45.0	0.8	0.6
June 21/2010	July4/2010	3	5	2	10.0	12.2	44.5	0.6	0.5
June 21/2010	July4/2010	3	5	4	12.8	16.4	33.0	1.3	0.7
June 21/2010	July4/2010	3	5	4	12.2	15.9	50.0	1.2	0.7
June 21/2010	July4/2010	3	5	6	17.2	21.5	73.4	1.7	0.8
June 21/2010	July4/2010	3	5	6	13.7	17.2	51.0	1.2	0.7
June 21/2010	July4/2010	3	5	2	6.4	9.2	47.5	0.9	0.6
June 21/2010	July4/2010	3	5	2	5.4	10.0	15.0	0.9	0.6
June 21/2010	July4/2010	3	5	4	11.7	15.1	54.2	1.0	0.7
June 21/2010	July4/2010	3	5	4	9.4	13.4	57.2	1.3	0.8
June 21/2010	July4/2010	3	5	6	11.3	15.8	51.4	1.3	0.9
June 21/2010	July4/2010	3	5	6	11.2	14.0	39.1	0.9	0.7
June 21/2010	July4/2010	3	5	2	13.0	16.9	68.7	1.3	0.8
June 21/2010	July4/2010	3	5	2	11.6	14.4	47.2	0.9	0.6
June 21/2010	July4/2010	3	5	4	12.7	18.5	72.5	2.0	0.9
June 21/2010	July4/2010	3	5	4	14.0	18.0	50.2	1.3	0.7
June 21/2010	July4/2010	3	5	6	15.8	19.1	55.8	1.1	0.7
June 21/2010	July4/2010	3	5	6	17.7	21.4	63.4	1.2	0.8
June 21/2010	July4/2010	3	5	2	8.0	10.3	29.0	0.7	0.6
June 21/2010	July4/2010	3	5	2	9.0	11.4	29.0	0.8	0.6
June 21/2010	July4/2010	3	5	4	13.8	17.5	46.5	1.3	0.7
June 21/2010	July4/2010	3	5	4	15.5	19.5	81.5	1.4	0.9
June 21/2010	July4/2010	3	5	6	16.0	21.5	79.8	1.9	1.1
June 21/2010	July4/2010	3	5	6	14.0	17.1	39.1	1.2	0.7
June 21/2010	July4/2010	3	5	2	7.7	9.8	28.5	0.6	0.5
June 21/2010	July4/2010	3	5	2	9.8	12.0	35.1	0.6	0.5
June 21/2010	July4/2010	3	5	4	11.8	16.0	58.2	1.3	0.7
June 21/2010	July4/2010	3	5	4	9.6	12.0	28.0	0.7	0.6
June 21/2010	July4/2010	3	5	6	14.0	16.5	52.8	0.8	0.6
June 21/2010	July4/2010	3	5	6	15.6	19.5	55.0	1.3	0.7
June 21/2010	July4/2010	3	5	2	5.5	7.2	25.2	0.6	0.5

June 21/2010	July5/2010	3	5	2	9.0	11.7	57.5	0.8	0.6
June 21/2010	July5/2010	3	5	4	10.4	13.1	43.7	0.9	0.7
June 21/2010	July5/2010	3	5	4	11.0	14.4	50.0	1.2	0.7
June 21/2010	July5/2010	3	5	6	11.5	14.5	44.5	0.8	0.9
June 21/2010	July5/2010	3	5	6	16.0	19.4	61.2	1.2	0.8
June 21/2010	July5/2010	3	5	2	5.3	7.3	16.5	0.6	0.6
June 21/2010	July5/2010	3	5	2	9.4	11.4	37.3	0.7	0.5
June 21/2010	July5/2010	3	5	4	9.5	11.6	30.4	0.7	0.6
June 21/2010	July5/2010	3	5	4	11.7	15.1	53.2	1.0	0.7
June 21/2010	July5/2010	3	5	6	13.7	15.9	47.6	1.0	0.8
June 21/2010	July5/2010	3	5	6	9.9	12.9	61.2	1.0	0.7
June 21/2010	July5/2010	3	5	8	34.5	NA	40.1	1.3	NA
June 20/2010	July5/2010	3	5	2	8.2	10.4	28.9	0.6	0.6
June 20/2010	July5/2010	3	5	2	9.2	11.5	34.9	0.7	0.7
June 20/2010	July5/2010	3	5	4	13.2	15.9	46.3	0.9	0.6
June 20/2010	July5/2010	3	5	4	5.9	8.0	13.2	0.5	0.5
June 20/2010	July5/2010	3	5	6	15.3	18.5	53.5	1.2	0.8
June 20/2010	July5/2010	3	5	6	18.0	21.3	58.7	1.1	0.7
June 20/2010	July5/2010	3	5	2	8.4	10.4	29.1	0.5	0.6
June 20/2010	July5/2010	3	5	2	7.4	9.6	20.1	0.6	0.6
June 20/2010	July5/2010	3	5	4	8.9	11.5	33.5	0.8	0.6
June 20/2010	July5/2010	3	5	4	11.8	14.9	47.5	0.9	0.7
June 20/2010	July5/2010	3	5	6	14.7	17.8	47.0	0.8	0.8
June 20/2010	July5/2010	3	5	6	20.6	24.7	73.2	1.3	0.9
June 20/2010	July5/2010	3	5	2	8.3	10.3	26.7	0.6	0.7
June 20/2010	July5/2010	3	5	2	7.3	9.3	21.6	0.6	0.7
June 20/2010	July5/2010	3	5	4	8.5	10.5	32.1	0.6	0.5
June 20/2010	July5/2010	3	5	4	7.4	9.4	32.1	0.6	0.6
June 20/2010	July5/2010	3	5	6	16.0	18.7	44.5	0.8	0.7
June 20/2010	July5/2010	3	5	6	14.4	18.5	58.2	1.2	0.9
June 20/2010	July5/2010	3	5	2	10.2	16.7	34.5	1.2	0.6
June 20/2010	July5/2010	3	5	2	7.3	9.4	28.0	0.6	0.6

June 20/2010	July5/2010	3	5	4	7.6	9.7	17.8	0.6	0.6
June 20/2010	July5/2010	3	5	4	9.5	12.0	21.9	0.6	0.6
June 20/2010	July5/2010	3	5	6	18.0	20.7	51.2	0.8	0.7
June 20/2010	July5/2010	3	5	6	17.0	20.3	49.1	0.9	0.7
June 20/2010	July5/2010	3	5	2	10.0	12.1	30.2	0.6	0.6
June 20/2010	July5/2010	3	5	2	6.5	8.6	26.9	0.5	0.5
June 20/2010	July5/2010	3	5	4	18.2	15.9	38.1	0.8	0.7
June 20/2010	July5/2010	3	5	4	10.8	17.1	22.3	1.5	0.6
June 20/2010	July5/2010	3	5	6	11.6	14.2	44.2	0.7	0.6
June 20/2010	July5/2010	3	5	6	16.4	19.5	48.0	0.9	0.7
June 20/2010	July5/2010	3	5	2	7.1	9.2	23.9	0.6	0.6
June 20/2010	July5/2010	3	5	2	6.8	8.9	27.1	0.5	0.5
June 20/2010	July5/2010	3	5	4	10.9	18.2	39.8	0.7	0.6
June 20/2010	July5/2010	3	5	4	9.1	11.5	32.1	0.7	0.6
June 20/2010	July5/2010	3	5	6	NA	NA	NA	NA	NA
June 20/2010	July5/2010	3	5	6	15.0	19.0	45.1	0.8	0.7
June 20/2010	July5/2010	3	5	2	9.5	16.5	34.3	2.1	0.6
June 20/2010	July5/2010	3	5	2	7.5	9.6	27.5	0.6	0.6
June 20/2010	July5/2010	3	5	4	9.6	12.0	40.6	0.7	0.6
June 20/2010	July5/2010	3	5	4	8.4	11.6	34.5	0.6	1.3
June 20/2010	July5/2010	3	5	6	14.8	17.8	51.8	0.9	0.6
June 20/2010	July5/2010	3	5	6	12.9	15.4	37.1	0.7	0.6
June 21/2010	July5/2010	3	5	2	8.7	10.8	32.1	0.6	0.5
June 21/2010	July5/2010	3	5	2	8.0	10.4	26.1	0.7	0.6
June 21/2010	July5/2010	3	5	4	9.7	12.3	40.1	0.8	0.7
June 21/2010	July5/2010	3	5	4	10.3	13.1	42.4	0.9	0.6
June 21/2010	July5/2010	3	5	6	12.1	15.1	51.5	1.0	0.6
June 21/2010	July5/2010	3	5	6	9.0	11.4	25.5	0.7	0.6
July4/2010	July19/2010	4	5	2	7.4	8.5	25.0	0.6	0.5
July4/2010	July19/2010	4	5	2	NA	NA	NA	NA	NA
July4/2010	July19/2010	4	5	4	8.7	9.7	23.2	0.6	0.6
July4/2010	July19/2010	4	5	4	9.6	10.6	28.3	0.6	0.6

July4/2010	July19/2010	4	5	6	15.0	16.2	35.1	0.7	0.6
July4/2010	July19/2010	4	5	6	15.1	16.7	51.5	0.7	0.7
July5/2010	July19/2010	4	5	2	8.2	9.2	27.7	0.6	0.6
July5/2010	July19/2010	4	5	2	7.0	8.1	26.2	0.5	0.5
July5/2010	July19/2010	4	5	4	10.9	12.1	37.4	0.7	0.6
July5/2010	July19/2010	4	5	4	NA	NA	NA	NA	NA
July5/2010	July19/2010	4	5	6	12.9	14.0	36.1	0.6	0.6
July5/2010	July19/2010	4	5	6	14.8	15.9	39.4	0.6	0.6
July5/2010	July19/2010	4	5	2	8.5	9.6	35.1	0.6	0.5
July5/2010	July19/2010	4	5	2	9.0	10.2	37.8	0.6	0.5
July5/2010	July19/2010	4	5	4	14.5	16.4	60.3	1.1	0.8
July5/2010	July19/2010	4	5	4	NA	NA	NA	NA	NA
July5/2010	July19/2010	4	5	6	10.4	11.5	28.1	0.7	0.6
July5/2010	July19/2010	4	5	6	10.8	12.0	45.4	0.6	0.6
July5/2010	July19/2010	4	5	2	6.8	7.7	22.1	0.5	0.5
July5/2010	July19/2010	4	5	2	8.0	9.0	27.2	0.5	0.5
July5/2010	July19/2010	4	5	4	10.0	11.2	29.7	0.6	0.6
July5/2010	July19/2010	4	5	4	13.0	14.1	43.1	0.7	0.6
July5/2010	July19/2010	4	5	6	15.5	16.7	50.3	0.7	0.6
July5/2010	July19/2010	4	5	6	20.2	22.4	58.5	1.0	0.8
July5/2010	July19/2010	4	5	2	12.4	13.6	43.5	0.7	0.6
July5/2010	July19/2010	4	5	2	9.8	10.8	37.0	0.5	0.5
July5/2010	July19/2010	4	5	4	9.6	10.6	27.8	0.6	0.6
July5/2010	July19/2010	4	5	4	8.6	9.6	19.0	0.5	0.5
July5/2010	July19/2010	4	5	6	13.2	14.4	45.7	0.7	0.7
July5/2010	July19/2010	4	5	6	12.6	13.7	40.9	0.7	0.6
July5/2010	July19/2010	4	5	2	11.5	12.5	39.5	0.5	0.5
July5/2010	July19/2010	4	5	2	11.8	13.1	49.1	0.7	0.6
July5/2010	July19/2010	4	5	4	11.5	12.7	49.0	0.7	0.6
July5/2010	July19/2010	4	5	4	10.5	11.5	34.7	0.6	0.6
July5/2010	July19/2010	4	5	6	18.0	14.0	26.0	0.6	0.6
July5/2010	July19/2010	4	5	6	13.8	14.2	40.3	0.5	0.5

July5/2010	July19/2010	4	5	2	6.1	7.1	22.5	0.5	0.5
July5/2010	July19/2010	4	5	2	11.1	12.2	29.0	0.7	0.6
July5/2010	July19/2010	4	5	4	10.6	11.6	38.5	0.6	0.6
July5/2010	July19/2010	4	5	4	10.5	11.4	31.0	0.6	0.6
July5/2010	July19/2010	4	5	6	16.5	17.6	44.5	0.7	0.7
July5/2010	July19/2010	4	5	6	19.1	20.5	49.0	0.8	0.7
July5/2010	July19/2010	4	5	2	8.2	9.3	27.0	0.6	0.6
July5/2010	July19/2010	4	5	2	8.3	9.5	24.0	0.5	0.5
July5/2010	July19/2010	4	5	4	13.5	14.5	40.4	0.7	0.7
July5/2010	July19/2010	4	5	4	13.5	14.6	30.2	0.7	0.6
July5/2010	July19/2010	4	5	6	14.4	16.8	43.1	0.8	0.6
July5/2010	July19/2010	4	5	6	15.2	16.2	34.0	0.8	0.8
July5/2010	July19/2010	4	5	2	7.2	8.2	30.0	0.5	0.5
July5/2010	July19/2010	4	5	2	8.0	9.2	20.3	0.5	0.5
July5/2010	July19/2010	4	5	4	12.0	13.2	40.0	0.7	0.7
July5/2010	July19/2010	4	5	4	11.3	12.3	25.9	0.5	0.5
July5/2010	July19/2010	4	5	6	13.1	14.1	32.5	0.6	0.5
July5/2010	July19/2010	4	5	6	12.6	13.6	27.5	0.6	0.5
July5/2010	July19/2010	4	5	2	9.3	10.3	25.2	0.5	0.5
July5/2010	July19/2010	4	5	2	NA	NA	NA	NA	NA
July5/2010	July19/2010	4	5	4	17.5	19.0	53.0	0.7	0.7
July5/2010	July19/2010	4	5	4	13.5	15.0	45.1	0.7	0.7
July5/2010	July19/2010	4	5	6	14.0	15.1	32.0	0.6	0.6
July5/2010	July19/2010	4	5	6	16.2	17.6	37.1	0.7	0.5
July5/2010	July19/2010	4	5	2	9.7	10.7	36.1	0.6	0.6
July5/2010	July19/2010	4	5	2	9.8	10.9	36.2	0.6	0.6
July5/2010	July19/2010	4	5	4	14.5	16.2	58.3	1.0	0.8
July5/2010	July19/2010	4	5	4	14.5	16.1	54.3	0.9	0.8
July5/2010	July19/2010	4	5	6	17.9	19.3	42.3	0.8	0.6
July5/2010	July19/2010	4	5	6	21.0	23.0	52.3	1.1	0.9
July5/2010	July19/2010	4	5	2	8.0	9.1	36.8	0.6	0.5
July5/2010	July19/2010	4	5	2	8.6	9.6	29.2	0.6	0.5

July5/2010	July19/2010	4	5	4	14.0	18.9	40.0	0.6	0.6
July5/2010	July19/2010	4	5	4	12.5	13.9	35.5	0.7	0.5
July5/2010	July19/2010	4	5	6	18.1	19.5	49.5	0.7	0.7
July5/2010	July19/2010	4	5	6	20.2	22.0	59.0	1.0	0.8
July5/2010	July19/2010	4	5	2	9.1	10.3	25.3	0.6	0.6
July5/2010	July19/2010	4	5	2	11.0	12.1	34.8	0.7	0.6
July5/2010	July19/2010	4	5	4	17.0	18.7	72.8	1.0	0.8
July5/2010	July19/2010	4	5	4	15.8	17.4	52.5	0.9	0.8
July5/2010	July19/2010	4	5	6	19.2	20.6	43.3	0.8	0.7
July5/2010	July19/2010	4	5	6	19.3	20.3	44.1	0.6	0.6
July5/2010	July19/2010	4	5	8	24.7	26.2	40.0	0.9	0.8
July5/2010	July19/2010	4	5	2	10.1	11.4	37.2	0.6	0.6
July5/2010	July19/2010	4	5	2	9.1	10.3	33.3	0.6	0.5
July5/2010	July19/2010	4	5	4	10.6	11.6	27.1	0.6	0.6
July5/2010	July19/2010	4	5	4	12.4	13.6	36.1	0.7	0.6
July5/2010	July19/2010	4	5	6	19.3	20.7	52.3	0.8	0.6
July5/2010	July19/2010	4	5	6	14.7	15.8	31.1	0.7	0.6
July5/2010	July19/2010	4	5	2	6.3	7.3	17.0	0.5	0.5
July5/2010	July19/2010	4	5	2	10.0	11.2	33.7	0.6	0.6
July5/2010	July19/2010	4	5	4	9.9	12.0	35.2	0.7	0.6
July5/2010	July19/2010	4	5	4	11.5	13.9	25.3	1.0	1.3
July5/2010	July19/2010	4	5	6	16.7	18.0	47.7	0.7	0.7
July5/2010	July19/2010	4	5	6	22.1	24.0	83.3	1.3	1.0
July5/2010	July19/2010	4	5	2	10.7	12.0	38.1	0.7	0.6
July5/2010	July19/2010	4	5	2	9.6	10.7	26.5	0.6	0.5
July5/2010	July19/2010	4	5	4	12.9	14.2	44.1	0.7	0.6
July5/2010	July19/2010	4	5	4	14.6	15.9	43.5	0.7	0.7
July5/2010	July19/2010	4	5	6	19.6	21.3	54.5	0.9	0.8
July5/2010	July19/2010	4	5	6	21.7	23.2	53.2	0.8	0.7
July5/2010	July18/2010	4	5	2	7.5	8.5	20.5	0.5	0.5
July5/2010	July18/2010	4	5	2	8.2	9.3	27.1	0.5	0.5
July5/2010	July18/2010	4	5	4	8.7	9.8	34.2	0.6	0.5

July5/2010	July18/2010	4	5	4	11.7	13.0	43.4	0.7	0.6
July5/2010	July18/2010	4	5	6	16.9	18.3	34.5	0.7	0.7
July5/2010	July18/2010	4	5	6	19.9	21.6	51.8	0.9	0.7
July5/2010	July18/2010	4	5	8	25.0	26.9	68.3	1.2	1.0
July5/2010	July18/2010	4	5	2	6.9	7.8	17.0	0.5	0.5
July5/2010	July18/2010	4	5	2	5.5	6.5	21.8	0.6	0.5
July5/2010	July18/2010	4	5	4	11.0	12.2	35.3	0.7	0.6
July5/2010	July18/2010	4	5	4	12.5	13.7	37.8	0.7	0.5
July5/2010	July18/2010	4	5	6	16.1	17.5	38.8	0.9	0.7
July5/2010	July18/2010	4	5	6	18.3	19.7	44.7	0.8	0.7
July5/2010	July18/2010	4	5	8	25.8	27.3	58.2	0.9	0.7
July5/2010	July18/2010	4	5	2	8.1	9.1	18.0	0.6	0.5
July5/2010	July18/2010	4	5	2	7.3	8.2	17.8	0.6	0.6
July5/2010	July18/2010	4	5	4	12.6	13.7	57.5	0.7	0.7
July5/2010	July18/2010	4	5	4	12.0	13.2	36.1	0.6	0.6
July5/2010	July18/2010	4	5	6	18.8	20.8	60.8	1.0	0.9
July5/2010	July18/2010	4	5	6	19.5	21.3	51.1	1.1	0.7
July5/2010	July18/2010	4	5	2	8.7	9.6	28.1	0.5	0.5
July5/2010	July18/2010	4	5	2	6.9	8.1	41.0	0.7	0.6
July5/2010	July18/2010	4	5	4	6.2	7.6	43.0	0.7	0.6
July5/2010	July18/2010	4	5	4	NA	NA	NA	NA	NA
July5/2010	July18/2010	4	5	6	16.5	17.7	30.7	0.7	0.6
July5/2010	July18/2010	4	5	6	18.6	20.8	58.8	NA	NA
July5/2010	July18/2010	4	5	2	9.4	10.4	29.5	0.6	0.6
July5/2010	July18/2010	4	5	2	10.0	10.5	34.3	0.6	0.5
July5/2010	July18/2010	4	5	4	11.5	12.7	34.5	0.6	0.5
July5/2010	July18/2010	4	5	4	12.7	13.9	42.1	0.7	0.6
July5/2010	July18/2010	4	5	6	15.7	17.0	53.0	0.8	0.7
July5/2010	July18/2010	4	5	6	15.8	17.0	44.4	0.7	0.6
July5/2010	July18/2010	4	5	8	26.5	28.3	62.9	1.1	0.9
July4/2010	July18/2010	4	5	2	12.8	14.1	34.2	0.7	0.6
July4/2010	July18/2010	4	5	2	11.3	13.1	66.0	0.9	0.7

July4/2010	July18/2010	4	5	4	13.2	15.5	69.1	1.2	1.0
July4/2010	July18/2010	4	5	4	17.5	19.4	58.4	1.0	0.8
July4/2010	July18/2010	4	5	6	13.5	15.2	43.5	0.8	0.7
July4/2010	July18/2010	4	5	6	18.9	21.2	59.8	1.5	1.0
July5/2010	July18/2010	4	5	2	8.8	9.9	30.2	0.7	0.6
July5/2010	July18/2010	4	5	2	9.6	10.6	36.5	0.7	0.6
July5/2010	July18/2010	4	5	4	13.7	15.1	46.2	1.0	0.8
July5/2010	July18/2010	4	5	4	13.4	14.6	44.8	0.9	0.6
July5/2010	July18/2010	4	5	6	14.3	16.0	52.0	0.9	0.8
July5/2010	July18/2010	4	5	6	NA	NA	NA	NA	NA
July5/2010	July18/2010	4	5	8	27.5	30.1	75.0	1.2	1.1
July4/2010	July18/2010	4	5	2	12.8	14.1	39.8	0.7	0.6
July4/2010	July18/2010	4	5	2	15.1	16.5	58.2	0.7	0.6
July4/2010	July18/2010	4	5	4	17.3	19.2	63.5	1.0	0.8
July4/2010	July18/2010	4	5	4	17.2	18.8	58.1	0.8	0.7
July4/2010	July18/2010	4	5	6	19.5	25.1	52.0	0.9	0.7
July4/2010	July18/2010	4	5	6	16.3	17.7	40.5	0.7	0.6
July4/2010	July18/2010	4	5	2	8.7	9.8	26.1	0.6	0.5
July4/2010	July18/2010	4	5	2	9.6	10.8	37.2	0.7	0.5
July4/2010	July18/2010	4	5	4	17.4	19.1	60.2	0.9	0.8
July4/2010	July18/2010	4	5	4	19.4	21.0	69.7	1.0	0.8
July4/2010	July18/2010	4	5	6	19.0	21.0	56.5	1.2	0.9
July4/2010	July18/2010	4	5	6	16.5	17.7	43.0	0.8	0.7
July4/2010	July18/2010	4	5	2	5.0	6.2	NA	0.5	0.5
July4/2010	July18/2010	4	5	2	9.5	10.8	44.5	0.7	0.6
July4/2010	July18/2010	4	5	4	12.8	14.1	42.1	1.0	0.8
July4/2010	July18/2010	4	5	4	7.8	9.2	44.1	0.5	0.7
July4/2010	July18/2010	4	5	6	21.9	23.8	55.5	1.1	0.8
July4/2010	July18/2010	4	5	6	19.5	20.8	53.0	0.8	0.7
July4/2010	July18/2010	4	5	2	9.5	10.9	33.3	0.7	0.6
July4/2010	July18/2010	4	5	2	9.5	10.6	29.1	0.7	0.7
July4/2010	July18/2010	4	5	4	13.2	14.7	36.8	0.7	0.8

July4/2010	July18/2010	4	5	4	12.7	14.1	44.1	0.8	0.6
July4/2010	July18/2010	4	5	6	19.0	21.2	54.8	1.2	0.9
July4/2010	July18/2010	4	5	6	19.7	21.5	64.5	0.9	0.7
July4/2010	July18/2010	4	5	2	10.5	11.7	25.5	0.6	0.6
July4/2010	July18/2010	4	5	2	NA	NA	NA	NA	NA
July4/2010	July18/2010	4	5	4	18.2	20.2	60.1	1.0	0.9
July4/2010	July18/2010	4	5	4	14.0	15.8	52.3	0.9	0.8
July4/2010	July18/2010	4	5	6	16.2	17.8	53.5	0.7	0.7
July4/2010	July18/2010	4	5	6	12.2	13.3	30.1	0.7	0.6
July4/2010	July18/2010	4	5	2	9.0	10.2	35.0	0.7	0.6
July4/2010	July18/2010	4	5	2	8.1	9.1	29.5	0.6	0.6
July4/2010	July18/2010	4	5	4	14.1	15.6	53.0	0.8	0.6
July4/2010	July18/2010	4	5	4	16.5	19.1	49.1	0.8	0.6
July4/2010	July18/2010	4	5	6	13.7	15.1	37.0	0.7	0.5
July4/2010	July18/2010	4	5	6	21.1	22.9	48.5	1.0	0.8
July4/2010	July18/2010	4	5	2	7.6	8.7	42.5	0.6	0.7
July4/2010	July18/2010	4	5	2	9.1	10.3	33.1	0.6	0.5
July4/2010	July18/2010	4	5	4	13.9	15.7	50.9	0.9	0.7
July4/2010	July18/2010	4	5	4	15.0	16.5	45.8	0.7	0.6
July4/2010	July18/2010	4	5	6	17.2	19.1	52.2	0.9	0.7
July4/2010	July18/2010	4	5	6	19.5	21.3	55.2	0.5	0.7
July4/2010	July18/2010	4	5	2	7.1	8.1	20.1	0.5	0.5
July4/2010	July18/2010	4	5	2	10.0	11.1	31.5	0.6	0.6
July4/2010	July18/2010	4	5	4	14.3	15.8	51.5	0.7	0.8
July4/2010	July18/2010	4	5	4	16.2	17.6	63.2	0.7	0.6
July4/2010	July18/2010	4	5	6	19.0	20.9	70.0	1.2	1.0
July4/2010	July18/2010	4	5	6	16.7	18.9	51.7	0.8	0.6
July4/2010	July18/2010	4	5	8	22.8	24.5	47.1	0.9	0.7
July4/2010	July19/2010	4	5	2	13.5	15.2	39.1	0.9	0.8
July4/2010	July19/2010	4	5	2	14.0	15.6	49.5	0.8	0.7
July4/2010	July19/2010	4	5	4	13.7	14.9	40.0	0.6	0.7
July4/2010	July19/2010	4	5	4	18.2	20.0	53.5	1.0	0.8

July4/2010	July19/2010	4	5	6	22.2	24.0	63.4	1.0	0.8
July4/2010	July19/2010	4	5	6	21.2	22.7	48.9	0.8	0.7
July4/2010	July19/2010	4	5	2	9.5	10.7	36.5	0.6	0.6
July4/2010	July19/2010	4	5	2	9.0	10.1	29.0	0.5	0.5
July4/2010	July19/2010	4	5	4	18.4	20.2	52.2	1.0	0.9
July4/2010	July19/2010	4	5	4	16.8	18.5	60.2	0.8	0.7
July4/2010	July19/2010	4	5	6	16.2	17.5	39.8	0.7	0.6
July4/2010	July19/2010	4	5	6	32.0	33.1	55.8	1.1	0.6
July4/2010	July19/2010	4	5	2	7.9	9.0	22.0	0.6	0.6
July4/2010	July19/2010	4	5	2	10.2	11.5	30.5	0.7	0.5
July4/2010	July19/2010	4	5	4	10.7	12.0	41.0	0.6	0.6
July4/2010	July19/2010	4	5	4	12.7	14.0	35.2	0.6	0.5
July4/2010	July19/2010	4	5	6	17.7	19.1	47.0	0.8	0.6
July4/2010	July19/2010	4	5	6	19.9	21.7	65.0	1.1	0.8
July5/2010	July19/2010	4	5	2	9.3	10.4	21.5	0.7	0.6
July5/2010	July19/2010	4	5	2	9.5	10.5	35.5	0.6	0.6
July5/2010	July19/2010	4	5	4	12.6	14.0	43.5	0.7	0.6
July5/2010	July19/2010	4	5	4	13.0	14.5	53.0	0.8	0.7
July5/2010	July19/2010	4	5	6	15.0	16.2	49.0	0.8	0.7
July5/2010	July19/2010	4	5	6	15.8	17.5	63.0	1.1	0.8
July5/2010	July19/2010	4	5	2	8.7	10.8	31.0	0.5	0.5
July5/2010	July19/2010	4	5	2	8.0	9.0	32.0	0.6	0.6
July5/2010	July19/2010	4	5	4	8.6	9.6	27.5	0.6	0.5
July5/2010	July19/2010	4	5	4	13.9	15.1	53.5	0.7	0.7
July5/2010	July19/2010	4	5	6	15.5	16.9	40.5	0.8	0.7
July5/2010	July19/2010	4	5	6	12.3	13.5	41.6	0.6	0.5
July5/2010	July19/2010	4	5	2	7.8	8.8	25.0	0.6	0.5
July5/2010	July19/2010	4	5	2	8.5	9.5	24.5	0.6	0.6
July5/2010	July19/2010	4	5	4	11.9	13.1	49.0	0.7	0.6
July5/2010	July19/2010	4	5	4	14.7	16.0	54.4	0.8	0.7
July5/2010	July19/2010	4	5	6	15.0	16.9	60.1	1.1	0.9
July5/2010	July19/2010	4	5	6	NA	NA	NA	NA	NA

July5/2010	July19/2010	4	5	2	8.7	9.8	32.4	0.8	0.8
July5/2010	July19/2010	4	5	2	NA	NA	NA	NA	NA
July5/2010	July19/2010	4	5	4	8.9	10.0	27.3	0.6	0.5
July5/2010	July19/2010	4	5	4	13.1	14.4	49.0	0.7	0.6
July5/2010	July19/2010	4	5	6	17.1	18.9	42.2	1.0	0.8
July5/2010	July19/2010	4	5	6	20.2	21.2	43.0	0.7	0.6
July5/2010	July19/2010	4	5	2	8.0	9.1	23.3	0.6	0.5
July5/2010	July19/2010	4	5	2	8.0	9.1	32.0	0.6	0.6
July5/2010	July19/2010	4	5	4	11.0	12.2	35.2	0.7	0.6
July5/2010	July19/2010	4	5	4	10.5	11.6	29.5	0.6	0.6
July5/2010	July19/2010	4	5	6	17.5	18.8	42.3	0.8	0.7
July5/2010	July19/2010	4	5	6	17.5	19.9	58.7	0.8	0.7
July5/2010	July19/2010	4	5	2	7.5	8.7	31.1	0.6	0.5
July5/2010	July19/2010	4	5	2	9.5	10.6	22.3	0.7	0.7
July5/2010	July19/2010	4	5	4	10.6	11.7	18.6	0.6	0.6
July5/2010	July19/2010	4	5	4	9.3	10.5	24.1	0.6	0.6
July5/2010	July19/2010	4	5	6	16.2	17.8	53.5	1.1	0.8
July5/2010	July19/2010	4	5	6	18.4	20.4	80.0	1.1	0.8
July5/2010	July19/2010	4	5	2	10.3	11.4	18.0	0.6	0.6
July5/2010	July19/2010	4	5	2	9.1	10.2	27.0	0.5	0.5
July5/2010	July19/2010	4	5	4	12.6	14.0	41.0	0.7	0.7
July5/2010	July19/2010	4	5	4	10.5	11.6	24.3	0.5	0.5
July5/2010	July19/2010	4	5	6	15.5	16.9	36.5	0.7	0.5
July5/2010	July19/2010	4	5	6	16.5	18.5	42.5	1.0	0.7
July5/2010	July19/2010	4	5	2	6.5	7.4	21.0	0.5	0.5
July5/2010	July19/2010	4	5	2	6.6	7.6	29.5	0.6	0.6
July5/2010	July19/2010	4	5	4	12.5	13.7	39.2	0.7	0.6
July5/2010	July19/2010	4	5	4	10.5	11.4	33.5	0.6	0.6
July5/2010	July19/2010	4	5	6	17.0	18.0	42.0	0.6	0.5
July5/2010	July19/2010	4	5	6	NA	NA	NA	NA	NA
July5/2010	July19/2010	4	5	2	6.9	7.9	34.0	0.5	0.5
July5/2010	July19/2010	4	5	2	6.8	7.6	21.0	0.5	0.6

July5/2010	July19/2010	4	5	4	9.4	10.4	39.2	0.6	0.6
July5/2010	July19/2010	4	5	4	8.1	9.0	27.5	0.5	0.5
July5/2010	July19/2010	4	5	6	18.0	19.3	64.0	0.8	0.7
July5/2010	July19/2010	4	5	6	16.0	17.4	44.5	0.8	0.6
July5/2010	July19/2010	4	5	2	7.0	8.0	18.2	0.5	0.5
July5/2010	July19/2010	4	5	2	NA	NA	NA	NA	NA
July5/2010	July19/2010	4	5	4	11.0	12.2	46.0	0.7	0.6
July5/2010	July19/2010	4	5	4	10.6	11.6	41.0	0.6	0.6
July5/2010	July19/2010	4	5	6	14.1	15.4	45.5	0.7	0.8
July5/2010	July19/2010	4	5	6	12.3	13.4	35.0	0.7	0.6
July19/2010	Aug2/2010	3	5	2	6.7	7.7	28.9	0.5	0.5
July19/2010	Aug2/2010	3	5	2	NA	NA	NA	NA	NA
July19/2010	Aug2/2010	3	5	4	9.5	10.5	31.5	0.6	0.7
July19/2010	Aug2/2010	3	5	4	7.8	8.9	24.0	0.6	0.5
July19/2010	Aug2/2010	3	5	6	15.5	16.7	37.2	0.7	0.6
July19/2010	Aug2/2010	3	5	6	9.8	10.8	18.9	0.5	0.5
July19/2010	Aug2/2010	3	5	2	7.7	8.7	32.6	0.6	0.6
July19/2010	Aug2/2010	3	5	2	5.8	6.8	29.2	0.5	0.6
July19/2010	Aug2/2010	3	5	4	10.0	11.1	42.1	0.6	0.6
July19/2010	Aug2/2010	3	5	4	9.1	10.2	30.3	0.6	0.6
July19/2010	Aug2/2010	3	5	6	11.8	12.7	31.4	0.6	0.6
July19/2010	Aug2/2010	3	5	6	15.7	17.0	48.1	0.7	0.6
July19/2010	Aug2/2010	3	5	2	8.6	9.6	38.6	0.5	0.5
July19/2010	Aug2/2010	3	5	2	10.3	11.3	37.2	0.6	0.6
July19/2010	Aug2/2010	3	5	4	NA	NA	NA	NA	NA
July19/2010	Aug2/2010	3	5	4	9.0	10.0	32.5	0.6	0.6
July19/2010	Aug2/2010	3	5	6	9.2	10.2	21.5	0.6	0.6
July19/2010	Aug2/2010	3	5	6	10.5	11.6	38.2	0.6	0.5
July19/2010	Aug2/2010	3	5	2	7.2	8.1	19.1	0.5	0.5
July19/2010	Aug2/2010	3	5	2	7.3	8.3	19.2	0.5	0.5
July19/2010	Aug2/2010	3	5	4	8.7	9.7	31.2	0.6	0.6
July19/2010	Aug2/2010	3	5	4	11.6	12.9	42.0	0.7	0.6

July19/2010	Aug2/2010	3	5	6	NA	NA	NA	NA	NA
July19/2010	Aug2/2010	3	5	6	19.2	20.9	67.6	1.0	0.8
July19/2010	Aug2/2010	3	5	2	12.1	13.2	37.9	0.6	0.6
July19/2010	Aug2/2010	3	5	2	11.1	12.1	41.9	0.6	0.6
July19/2010	Aug2/2010	3	5	4	10.0	11.0	27.3	0.5	0.5
July19/2010	Aug2/2010	3	5	4	NA	NA	NA	NA	NA
July19/2010	Aug2/2010	3	5	6	14.8	16.0	33.6	0.6	0.6
July19/2010	Aug2/2010	3	5	6	14.9	16.2	44.1	0.8	0.7
July19/2010	Aug2/2010	3	5	2	12.1	13.1	34.2	0.5	0.5
July19/2010	Aug2/2010	3	5	2	14.1	15.3	39.2	0.7	0.6
July19/2010	Aug2/2010	3	5	4	15.5	16.7	45.8	0.7	0.6
July19/2010	Aug2/2010	3	5	4	13.5	14.5	33.7	0.6	0.6
July19/2010	Aug2/2010	3	5	6	14.9	15.9	41.7	0.6	0.6
July19/2010	Aug2/2010	3	5	6	16.0	17.1	40.5	0.7	0.6
July19/2010	Aug2/2010	3	5	2	11.6	12.6	24.5	0.6	0.6
July19/2010	Aug2/2010	3	5	2	13.6	14.6	31.2	0.6	0.6
July19/2010	Aug2/2010	3	5	4	14.7	15.6	38.3	0.7	0.6
July19/2010	Aug2/2010	3	5	4	14.7	15.8	42.6	0.6	0.6
July19/2010	Aug2/2010	3	5	6	21.8	23.4	52.6	1.0	0.8
July19/2010	Aug2/2010	3	5	6	19.0	20.3	43.8	0.7	0.6
July19/2010	Aug2/2010	3	5	2	9.9	11.0	27.1	0.6	0.6
July19/2010	Aug2/2010	3	5	2	NA	NA	NA	NA	NA
July19/2010	Aug2/2010	3	5	4	15.1	16.3	39.2	0.6	0.6
July19/2010	Aug2/2010	3	5	4	17.3	18.2	38.5	0.7	0.6
July19/2010	Aug2/2010	3	5	6	19.1	20.9	33.4	1.0	0.8
July19/2010	Aug2/2010	3	5	6	18.5	20.0	49.3	0.9	0.7
July19/2010	Aug2/2010	3	5	2	7.6	8.4	18.0	0.6	0.6
July19/2010	Aug2/2010	3	5	2	6.9	8.0	24.5	0.5	0.5
July19/2010	Aug2/2010	3	5	4	11	12.2	41.1	0.7	0.6
July19/2010	Aug2/2010	3	5	4	11.3	12.2	28.2	0.6	0.5
July19/2010	Aug2/2010	3	5	6	11.4	12.8	36.2	0.7	0.6
July19/2010	Aug2/2010	3	5	6	14.6	15.5	32.5	0.6	0.6

July19/2010	Aug2/2010	3	5	2	7.7	8.8	24.1	0.6	0.6
July19/2010	Aug2/2010	3	5	2	NA	NA	NA	NA	NA
July19/2010	Aug2/2010	3	5	4	20	21.6	60.4	0.9	0.8
July19/2010	Aug2/2010	3	5	4	13	14.1	47.1	0.8	0.6
July19/2010	Aug2/2010	3	5	6	14.5	15.7	35.3	0.7	0.6
July19/2010	Aug2/2010	3	5	6	28.5	29.8	43.9	0.7	0.6
July19/2010	Aug3/2010	3	5	2	8.3	9.3	25.5	0.6	0.5
July19/2010	Aug3/2010	3	5	2	10.2	11.2	31.2	0.6	0.6
July19/2010	Aug3/2010	3	5	4	9.3	10.4	22.7	0.6	0.5
July19/2010	Aug3/2010	3	5	4	14.1	15.6	60.9	0.9	0.7
July19/2010	Aug3/2010	3	5	6	20.3	21.9	48.6	0.9	0.8
July19/2010	Aug3/2010	3	5	6	14.5	15.6	32.5	0.7	0.6
July19/2010	Aug3/2010	3	5	2	6.6	7.6	23.1	0.5	0.5
July19/2010	Aug3/2010	3	5	2	13.3	15.5	32.2	0.7	0.6
July19/2010	Aug3/2010	3	5	4	13.4	14.4	35.5	0.5	0.5
July19/2010	Aug3/2010	3	5	4	13.0	13.9	31.0	0.6	0.6
July19/2010	Aug3/2010	3	5	6	14.0	15.1	34.1	0.6	0.5
July19/2010	Aug3/2010	3	5	6	12.3	13.5	25.5	0.6	0.5
July19/2010	Aug3/2010	3	5	2	9.1	10.2	20.0	0.6	0.6
July19/2010	Aug3/2010	3	5	2	15.3	16.5	29.1	0.6	0.5
July19/2010	Aug3/2010	3	5	4	11.0	11.9	24.0	0.6	0.5
July19/2010	Aug3/2010	3	5	4	17.0	18.5	57.1	1.0	0.7
July19/2010	Aug3/2010	3	5	6	20.8	22.4	49.3	0.9	0.7
July19/2010	Aug3/2010	3	5	6	NA	NA	NA	NA	NA
July19/2010	Aug3/2010	3	5	2	11.0	12.0	38.9	0.6	0.6
July19/2010	Aug3/2010	3	5	2	8.8	9.8	21.3	0.5	0.6
July19/2010	Aug3/2010	3	5	4	19.3	20.8	53.2	0.9	0.7
July19/2010	Aug3/2010	3	5	4	NA	NA	NA	NA	NA
July19/2010	Aug3/2010	3	5	6	17.8	19.6	47.8	0.9	0.8
July19/2010	Aug3/2010	3	5	6	16.3	17.4	39.0	0.7	0.6
July19/2010	Aug3/2010	3	5	2	13.0	14.0	18.0	0.5	0.5
July19/2010	Aug3/2010	3	5	2	10.9	11.9	33.5	0.5	0.5

July19/2010	Aug3/2010	3	5	4	13.0	14.1	34.6	0.7	0.5
July19/2010	Aug3/2010	3	5	4	15.2	16.3	45.2	0.6	0.6
July19/2010	Aug3/2010	3	5	6	20.7	22.4	58.1	1.1	0.8
July19/2010	Aug3/2010	3	5	6	17.4	18.8	44.5	0.9	0.7
July19/2010	Aug3/2010	3	5	2	13.6	14.7	33.1	0.6	0.6
July19/2010	Aug3/2010	3	5	2	11.7	12.7	28.0	0.6	0.6
July19/2010	Aug3/2010	3	5	4	18.0	19.3	39.1	0.7	0.7
July19/2010	Aug3/2010	3	5	4	NA	NA	NA	NA	NA
July19/2010	Aug3/2010	3	5	6	15.6	17.8	63.5	1.4	1.0
July19/2010	Aug3/2010	3	5	6	23.5	24.9	54.5	0.9	0.7
July18/2010	Aug3/2010	3	5	2	12.0	13.0	34.1	0.7	0.6
July18/2010	Aug3/2010	3	5	2	19.7	20.8	43.4	0.7	0.6
July18/2010	Aug3/2010	3	5	4	12.2	13.3	36.3	0.6	0.6
July18/2010	Aug3/2010	3	5	4	18.3	19.7	49.9	0.8	0.6
July18/2010	Aug3/2010	3	5	6	25.8	27.2	54.1	0.9	0.7
July18/2010	Aug3/2010	3	5	6	29.1	31.6	66.8	1.4	1.1
July18/2010	Aug3/2010	3	5	2	11.8	12.9	28.0	0.6	0.6
July18/2010	Aug3/2010	3	5	2	18.4	19.5	31.8	0.6	0.6
July18/2010	Aug3/2010	3	5	4	12.8	14.1	27.7	0.7	0.6
July18/2010	Aug3/2010	3	5	4	11.9	13.1	30.0	0.7	0.6
July18/2010	Aug3/2010	3	5	6	28.9	30.2	55.8	1.0	0.8
July18/2010	Aug3/2010	3	5	6	32.2	33.8	58.1	1.0	0.8
July18/2010	Aug3/2010	3	5	2	10.6	11.6	18.0	0.5	0.5
July18/2010	Aug3/2010	3	5	2	10.6	11.6	20.2	0.5	0.6
July18/2010	Aug3/2010	3	5	4	18.9	20.2	37.5	0.8	0.6
July18/2010	Aug3/2010	3	5	4	16.7	17.9	29.0	0.7	0.6
July18/2010	Aug3/2010	3	5	6	30.3	33.0	78.5	1.5	1.2
July18/2010	Aug3/2010	3	5	6	NA	NA	NA	NA	NA
July18/2010	Aug3/2010	3	5	2	7.8	8.9	32.5	0.6	0.6
July18/2010	Aug3/2010	3	5	2	7.6	8.6	42.0	0.5	0.5
July18/2010	Aug3/2010	3	5	4	19.1	20.7	73.2	0.9	0.8
July18/2010	Aug3/2010	3	5	4	13.3	14.4	36.7	0.7	0.6

July18/2010	Aug3/2010	3	5	6	21.4	22.8	38.7	0.8	0.7
July18/2010	Aug3/2010	3	5	6	NA	NA	NA	NA	NA
July18/2010	Aug3/2010	3	5	2	10.1	11.1	26.2	0.5	0.5
July18/2010	Aug3/2010	3	5	2	10.7	11.6	33.2	0.5	0.5
July18/2010	Aug3/2010	3	5	4	21.5	23.3	72.3	1.0	0.8
July18/2010	Aug3/2010	3	5	4	22.2	23.6	53.2	0.9	0.7
July18/2010	Aug3/2010	3	5	6	15.7	16.8	29.3	0.6	0.6
July18/2010	Aug3/2010	3	5	6	17.0	18.3	42.3	0.7	0.7
July18/2010	Aug2/2010	3	5	2	14.1	15.1	34.2	0.6	0.6
July18/2010	Aug2/2010	3	5	2	11.7	13.2	47.5	0.8	0.7
July18/2010	Aug2/2010	3	5	4	16.3	17.5	43.8	0.7	0.7
July18/2010	Aug2/2010	3	5	4	16.0	18.0	57.4	1.9	1.0
July18/2010	Aug2/2010	3	5	6	15.8	17.3	50.2	0.9	0.7
July18/2010	Aug2/2010	3	5	6	20.7	22.3	51.5	1.0	8.0
July18/2010	Aug3/2010	3	5	2	11.7	12.7	20.8	0.5	0.5
July18/2010	Aug3/2010	3	5	2	13.6	14.7	34.5	0.6	0.6
July18/2010	Aug3/2010	3	5	4	22.7	23.7	50.5	0.8	0.7
July18/2010	Aug3/2010	3	5	4	20.3	21.4	21.1	0.8	0.6
July18/2010	Aug3/2010	3	5	6	28.0	30.0	70.0	1.1	0.8
July18/2010	Aug3/2010	3	5	6	23.6	25.0	57.6	0.8	0.7
July18/2010	Aug2/2010	3	5	2	16.2	17.5	46.3	0.7	0.6
July18/2010	Aug2/2010	3	5	2	16.0	17.2	61.1	0.7	0.6
July18/2010	Aug2/2010	3	5	4	18.5	19.9	62.0	0.9	0.8
July18/2010	Aug2/2010	3	5	4	19.2	20.7	57.0	0.8	0.7
July18/2010	Aug2/2010	3	5	6	25.5	27.5	61.8	0.8	0.5
July18/2010	Aug2/2010	3	5	6	21.6	23.1	51.6	1.0	0.8
July18/2010	Aug2/2010	3	5	2	10.7	11.7	26.2	0.5	0.5
July18/2010	Aug2/2010	3	5	2	10.3	11.3	31.8	0.6	0.6
July18/2010	Aug2/2010	3	5	4	19.9	21.3	62.8	1.0	0.8
July18/2010	Aug2/2010	3	5	4	24.8	27.0	76.5	1.3	1.0
July18/2010	Aug2/2010	3	5	6	23.4	24.9	59.5	1.0	0.8
July18/2010	Aug2/2010	3	5	6	22.7	24.1	50.9	0.9	0.8

July18/2010	Aug2/2010	3	5	2	18.0	19.1	46.6	0.7	0.6
July18/2010	Aug2/2010	3	5	2	15.5	16.9	41.1	0.6	0.6
July18/2010	Aug2/2010	3	5	4	17.6	19.0	42.5	0.8	0.7
July18/2010	Aug2/2010	3	5	4	NA	NA	NA	NA	NA
July18/2010	Aug2/2010	3	5	6	23.0	24.6	51.0	1.0	0.7
July18/2010	Aug2/2010	3	5	6	27.0	28.8	72.8	1.1	0.9
July18/2010	Aug2/2010	3	5	2	6.6	7.6	28.8	0.6	0.6
July18/2010	Aug2/2010	3	5	2	6.4	7.4	12.0	0.6	0.6
July18/2010	Aug2/2010	3	5	4	19.6	20.8	41.0	0.7	0.6
July18/2010	Aug2/2010	3	5	4	17.1	18.3	42.0	0.7	0.7
July18/2010	Aug2/2010	3	5	6	25.9	28.1	38.5	1.5	1.2
July18/2010	Aug2/2010	3	5	6	27.3	29.3	55.5	1.2	1.0
July18/2010	Aug2/2010	3	5	2	9.0	10.0	31.5	0.5	0.5
July18/2010	Aug2/2010	3	5	2	15.2	16.3	51.5	0.6	0.6
July18/2010	Aug2/2010	3	5	4	14.6	16.0	65.2	0.8	0.6
July18/2010	Aug2/2010	3	5	4	13.6	14.8	44.8	0.7	0.6
July18/2010	Aug2/2010	3	5	6	14.0	15.5	55.0	0.9	0.7
July18/2010	Aug2/2010	3	5	6	NA	NA	NA	NA	NA
July18/2010	Aug2/2010	3	5	2	9.9	10.8	38.5	0.5	0.5
July18/2010	Aug2/2010	3	5	2	7.3	8.4	14.0	0.6	0.6
July18/2010	Aug2/2010	3	5	4	17.3	18.8	57.1	0.8	0.7
July18/2010	Aug2/2010	3	5	4	18.8	21.1	54.1	0.9	0.8
July18/2010	Aug2/2010	3	5	6	19.8	21.1	53.5	0.8	0.9
July18/2010	Aug2/2010	3	5	6	25.5	27.6	67.2	1.3	1.0
July18/2010	Aug2/2010	3	5	2	11.6	12.6	26.0	0.6	0.5
July18/2010	Aug2/2010	3	5	2	12.9	13.9	34.8	0.6	0.6
July18/2010	Aug2/2010	3	5	4	17.6	19.2	59.4	0.9	0.7
July18/2010	Aug2/2010	3	5	4	17.5	18.8	51.2	0.8	0.7
July18/2010	Aug2/2010	3	5	6	22.6	24.5	66.7	1.2	0.7
July18/2010	Aug2/2010	3	5	6	25.3	27.0	60.1	0.9	0.8
July18/2010	Aug2/2010	3	5	2	12.9	14.0	26.5	0.6	0.6
July18/2010	Aug2/2010	3	5	2	11.5	12.6	33.1	0.6	0.6

July18/2010	Aug2/2010	3	5	4	16.6	17.8	58.1	0.8	0.7
July18/2010	Aug2/2010	3	5	4	13.0	14.5	47.2	0.9	0.7
July18/2010	Aug2/2010	3	5	6	22.4	24.5	84.5	1.6	1.4
July18/2010	Aug2/2010	3	5	6	21.2	23.0	71.0	1.2	0.8
July19/2010	Aug2/2010	3	5	2	13.3	14.5	43.6	0.7	0.6
July19/2010	Aug2/2010	3	5	2	15.1	16.5	41.0	0.8	0.7
July19/2010	Aug2/2010	3	5	4	12.5	13.7	41.2	0.7	0.6
July19/2010	Aug2/2010	3	5	4	10.7	11.9	29.3	0.7	0.6
July19/2010	Aug2/2010	3	5	6	12.8	13.9	33.1	0.6	0.6
July19/2010	Aug2/2010	3	5	6	21.1	22.9	66.2	1.2	0.9
July19/2010	Aug2/2010	3	5	2	10.6	11.6	35.8	0.5	0.5
July19/2010	Aug2/2010	3	5	2	11.1	12.1	29.8	0.6	0.5
July19/2010	Aug2/2010	3	5	4	22.0	23.8	70.5	1.0	0.8
July19/2010	Aug2/2010	3	5	4	17.4	18.8	61.1	0.9	0.8
July19/2010	Aug2/2010	3	5	6	19.5	20.9	45.0	0.9	0.7
July19/2010	Aug2/2010	3	5	6	22.9	24.7	56.9	1.0	0.8
July19/2010	Aug2/2010	3	5	2	8.7	9.8	20.5	0.5	0.5
July19/2010	Aug2/2010	3	5	2	12.0	13.0	31.5	0.6	0.6
July19/2010	Aug2/2010	3	5	4	13.8	14.9	41.1	0.6	0.6
July19/2010	Aug2/2010	3	5	4	14.1	15.2	37.5	0.6	0.5
July19/2010	Aug2/2010	3	5	6	19.0	20.6	53.0	1.0	0.7
July19/2010	Aug2/2010	3	5	6	13.5	14.6	40.1	0.6	0.6
July19/2010	Aug2/2010	3	5	2	NA	NA	NA	NA	NA
July19/2010	Aug2/2010	3	5	2	10.0	11.0	36.2	0.6	0.6
July19/2010	Aug2/2010	3	5	4	14.0	15.3	42.5	0.7	0.6
July19/2010	Aug2/2010	3	5	4	14.1	15.7	54.5	1.0	0.7
July19/2010	Aug2/2010	3	5	6	18.6	20.2	58.5	1.1	0.8
July19/2010	Aug2/2010	3	5	6	14.0	15.1	31.9	0.5	0.5
July19/2010	Aug2/2010	3	5	2	NA	NA	NA	NA	NA
July19/2010	Aug2/2010	3	5	2	10.5	11.6	32.5	0.5	0.4
July19/2010	Aug2/2010	3	5	4	10.3	11.3	22.8	0.5	0.5
July19/2010	Aug2/2010	3	5	4	19.4	20.8	71.8	0.8	0.7

July19/2010	Aug2/2010	3	5	6	22.7	24.4	60.5	1.1	0.8
July19/2010	Aug2/2010	3	5	6	17.8	19.0	53.5	0.7	0.7
July19/2010	Aug2/2010	3	5	2	10.1	11.1	23.2	0.6	0.5
July19/2010	Aug2/2010	3	5	2	11.6	12.7	27.2	0.5	0.5
July19/2010	Aug2/2010	3	5	4	19	20.2	58.5	0.7	0.7
July19/2010	Aug2/2010	3	5	4	20.5	21.9	65.1	0.9	0.9
July19/2010	Aug2/2010	3	5	6	23.2	25.7	77.8	1.6	1.1
July19/2010	Aug2/2010	3	5	6	22.1	23.6	66.6	1.0	0.8
July19/2010	Aug2/2010	3	5	2	12.2	13.6	37.9	0.7	0.6
July19/2010	Aug2/2010	3	5	2	11.2	12.4	33.2	0.7	0.6
July19/2010	Aug2/2010	3	5	4	15.8	16.9	44.2	0.7	0.6
July19/2010	Aug2/2010	3	5	4	16.1	17.4	47.5	0.7	0.7
July19/2010	Aug2/2010	3	5	6	13.3	14.5	36.1	0.7	0.7
July19/2010	Aug2/2010	3	5	6	33.1	35.2	77.0	1.3	1.0
July19/2010	Aug2/2010	3	5	2	11.2	12.2	27.1	0.6	0.6
July19/2010	Aug2/2010	3	5	2	10.5	11.6	28.3	0.5	0.6
July19/2010	Aug2/2010	3	5	4	18.1	19.0	39.3	0.7	0.6
July19/2010	Aug2/2010	3	5	4	16	17.0	34.0	0.6	0.6
July19/2010	Aug2/2010	3	5	6	25.5	27.3	61.2	1.1	0.8
July19/2010	Aug2/2010	3	5	6	NA	NA	NA	NA	NA
July19/2010	Aug2/2010	3	5	2	11.6	12.2	27.1	0.8	0.7
July19/2010	Aug2/2010	3	5	2	13.2	14.8	27.2	0.7	0.6
July19/2010	Aug2/2010	3	5	4	16.2	17.5	51.5	0.7	0.7
July19/2010	Aug2/2010	3	5	4	11.6	12.0	17.2	0.7	0.7
July19/2010	Aug2/2010	3	5	6	16	17.2	40.6	0.7	0.6
July19/2010	Aug2/2010	3	5	6	32.5	34.7	89.1	1.9	1.2
July19/2010	Aug2/2010	3	5	2	12.9	14.0	28.1	0.6	0.6
July19/2010	Aug2/2010	3	5	2	NA	NA	NA	NA	NA
July19/2010	Aug2/2010	3	5	4	20.7	22.2	47.2	0.9	0.7
July19/2010	Aug2/2010	3	5	4	17.9	19.0	45.1	0.6	0.6
July19/2010	Aug2/2010	3	5	6	25	26.8	50.5	0.9	0.8
July19/2010	Aug2/2010	3	5	6	16.3	18.6	58.2	1.5	1.1

July19/2010	Aug2/2010	3	5	2	14.1	15.2	33.1	0.7	0.6
July19/2010	Aug2/2010	3	5	2	9.9	10.9	26.5	0.6	0.5
July19/2010	Aug2/2010	3	5	4	18.1	19.5	52.5	0.9	0.7
July19/2010	Aug2/2010	3	5	4	15.6	16.9	36.2	0.7	0.6
July19/2010	Aug2/2010	3	5	6	27.9	29.6	72.1	1.0	0.8
July19/2010	Aug2/2010	3	5	6	20	21.9	67.2	1.1	0.9
July19/2010	Aug3/2010	3	5	2	12.2	13.2	39.8	0.5	0.5
July19/2010	Aug3/2010	3	5	2	13.3	14.3	29.8	0.6	0.5
July19/2010	Aug3/2010	3	5	4	12.0	13.0	37.1	0.6	0.6
July19/2010	Aug3/2010	3	5	4	14.8	15.9	41.1	0.7	0.5
July19/2010	Aug3/2010	3	5	6	14.2	15.3	32.7	0.7	0.6
July19/2010	Aug3/2010	3	5	6	18.7	20.2	47.2	0.8	0.7
July19/2010	Aug2/2010	3	5	2	11.0	11.9	18.2	0.5	0.5
July19/2010	Aug2/2010	3	5	2	10.4	11.3	29.0	0.5	0.5
July19/2010	Aug2/2010	3	5	4	18.8	20.0	51.2	0.7	0.5
July19/2010	Aug2/2010	3	5	4	12.8	13.7	48.1	0.6	0.6
July19/2010	Aug2/2010	3	5	6	16.1	17.6	52.8	0.9	0.8
July19/2010	Aug2/2010	3	5	6	15.4	16.6	33.8	0.7	0.6